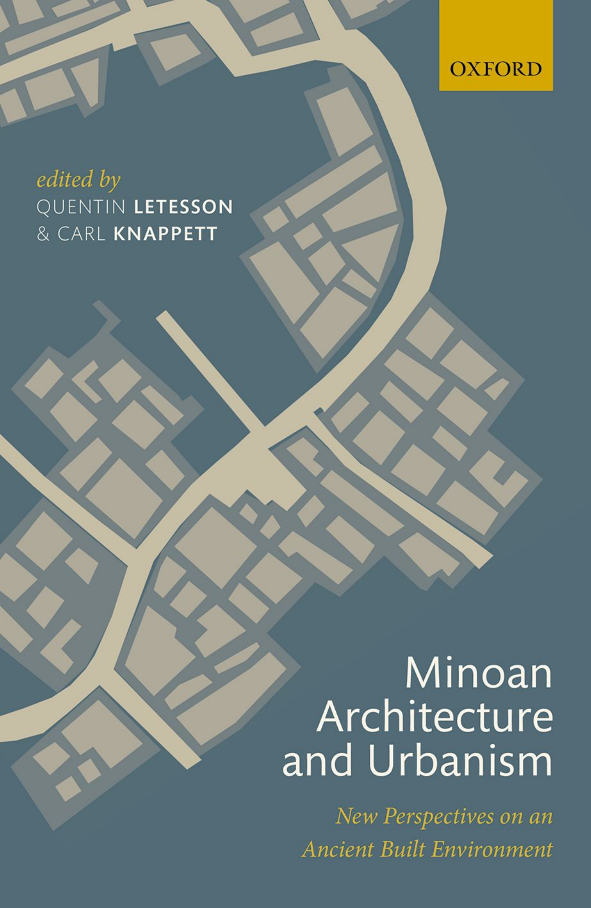

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edited by
QUENTIN **LETESSON**
& CARL **KNAPPETT**

Minoan Architecture and Urbanism

New Perspectives on an Ancient Built Environment

MINOAN ARCHITECTURE AND URBANISM

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New Perspectives on an Ancient Built Environment

Edited by
QUENTIN LETESSON AND
CARL KNAPPETT

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1

Introduction—Minoan Built Environment

Past Studies, Recent Perspectives, and Future Challenges

Quentin Letesson and Carl Knappett

1.1. A BRIEF HISTORIOGRAPHY

Architecture and urbanism have been of constant interest to Minoan archaeologists since the beginning of the twentieth century. While there is some scholarly bias to this, with the field deeply affected by Sir Arthur Evans's focus on the monumental architecture of Knossos, Minoan Crete continues to yield abundant evidence for a substantial built environment. Focusing on urban and architectural remains creates a strong bias in favour of one block of time, the Neopalatial period (Table 1.1), which produced the largest amount of well-preserved settlements and buildings. Yet, in general, the evidence we now have on the Minoan built environment is an undeniable resource, one that continues to grow thanks to ongoing studies of pre-existing remains as well as new excavation and survey projects.

As is clear in Evans's magnum opus, *The Palace of Minos at Knossos*, the large-scale excavations typical of the dawn of the last century were heavily directed towards the urban cores of the largest Minoan sites (e.g. Boyd Hawes et al. 1908; Hutchinson 1950). The bulk of what we know about the Minoan built environment comes from the first half of the twentieth century, initially through the intensive work of the foreign schools at Malia, Phaistos, Palaikastro, Gournia, Mochlos, and Pseira, later joined by countless excavations by Greek archaeologists (Fig. 1.1). Yet, synthetic treatments really only began with the work of James Walter Graham, in the form of numerous papers published in the *American Journal of Archaeology* (see Letesson 2009 for a detailed review), and especially his *Palaces of Crete* (Graham 1962). Nonetheless,

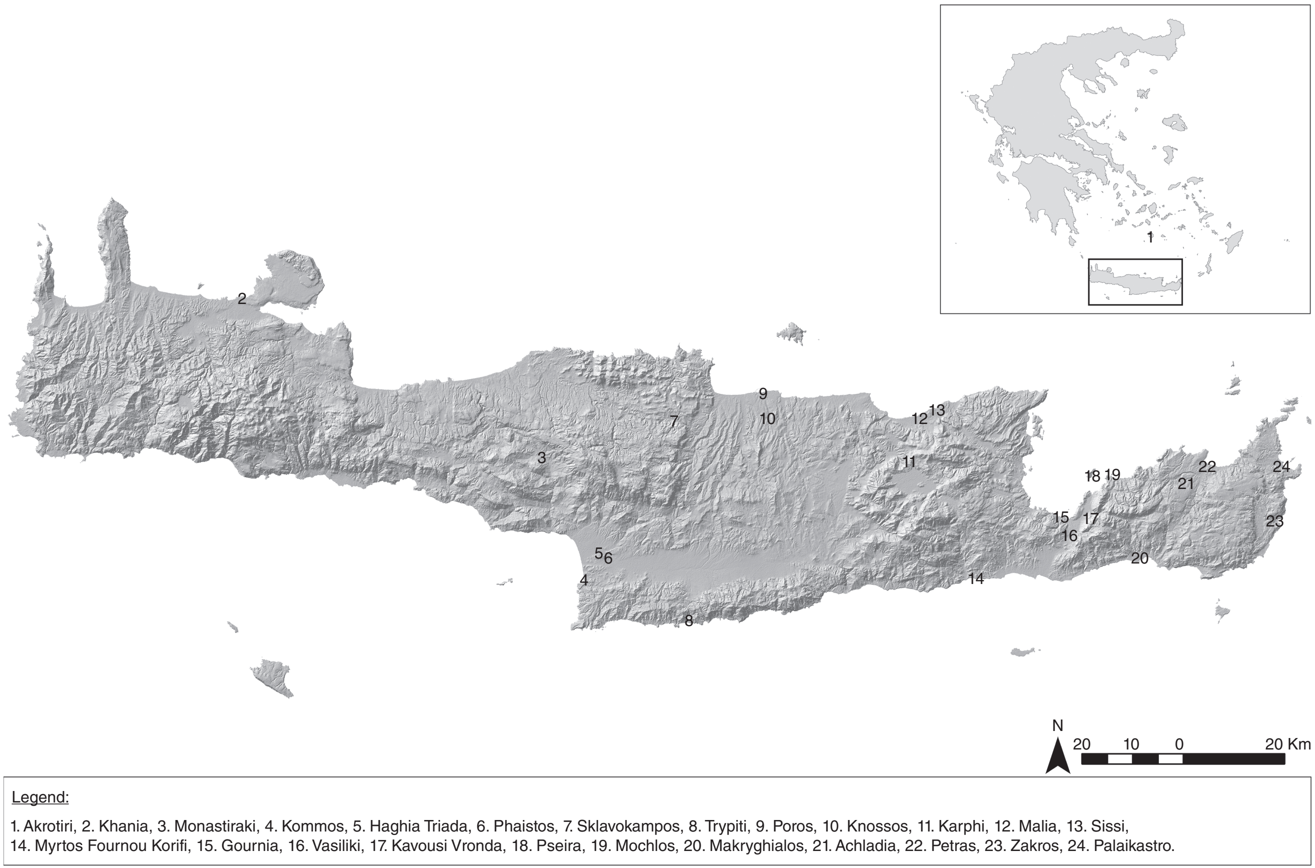
Table 1.1. Minoan periods and approximate absolute chronology for the Cretan Bronze Age (after Manning 2010; EM IA phase after Schoep, Tomkins, and Driessen 2012).

Minoan periods	Cretan Bronze Age phases	Approximate dates BCE
Prepalatial	Early Minoan (EM) IA	3100/3000–2900
	EM IB	2900–2650
	EM IIA	2650–2450/2400
	EM IIB	2450/2400–2200
	EM III	2200–2100/2050
	Middle Minoan (MM) IA	2100/2050–1925/1900
Protopalatial	MM IB	1925/1900–1875/1850
	MM II	1875/1850–1750/1700
Neopalatial	MM III (A–B)	1750/1700–1700/1675
	Late Minoan (LM) IA	1700/1675–1625/1600
	LM IB	1625/1600–1470/1460
Palatial Final	LM II	1470/1460–1420/1410
	LM IIIA1	1420/1410–1390/1370
Postpalatial	LM IIIA2	1390/1370–1330/1315
	LM IIIB	1330/1315–1200/1190
	LM IIIC	1200/1190–1075/1050

his comparative analyses, which also dealt with non-palatial buildings, were largely focused on polite architecture. With a particular interest in form and function, he built on Evans's insights to be the first to identify, across a large sample of buildings, recurring architectural patterns in the Minoan built environment (e.g. *Piano Nobile*, residential quarters, banquet halls). His studies also included an innovative quantitative component, emphasizing the existence of a unit of length that builders would have used to lay out the palaces and some of the so-called 'villas'.

Another turning point was reached when, in 1973, Joseph Shaw published his comprehensive account of the materials and techniques used in Minoan architecture (Shaw 1973; see Shaw 2009 for the revised second edition). Still unmatched in its scope and quality, this book evaluated Minoan construction techniques across all types of buildings, thereby acknowledging explicitly domestic and vernacular buildings that were barely considered before. Nevertheless, apart from works related to the excavations at Kommos (see chapter 10), subsequent publications by Shaw, when they were not concerned with technical characteristics of Minoan architecture, were very much in line with the tradition initiated by Graham and mostly focused on palatial or polite architecture (e.g. Tripartite Shrines, orientation of the palaces; see Letesson 2009 for a detailed review), culminating in his recent book *Elite Minoan Architecture* (Shaw 2015; see also Driessen 1989–90).

This tradition, that one would be tempted to label Torontonian,[1] continued with Begg's (1975) work on storage areas in the Late Minoan period and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Legend:
1. Akrotiri, 2. Khania, 3. Monastiraki, 4. Kommos, 5. Haghia Triada, 6. Phaistos, 7. Sklavokampos, 8. Trypiti, 9. Poros, 10. Knossos, 11. Karphi, 12. Malia, 13. Sissi,
14. Myrtos Fournou Korifi, 15. Gournia, 16. Vasiliki, 17. Kavousi Vronda, 18. Pseira, 19. Mochlos, 20. Makryghialos, 21. Achladia, 22. Petras, 23. Zakros, 24. Palaikastro.

Fig. 1.1. Map of Crete with the principal sites mentioned in the volume (plan by Sylviane Déderix, with permission).

McEnroe's (1979) ambitious analysis of the Minoan built environment, doctoral theses both unfortunately unpublished. The latter work is groundbreaking in the sense that it addressed domestic structures, specialized buildings, and settlements, but also provided the first diachronic account of the Minoan built environment, from the Proto- to the Postpalatial periods (Table 1.1; for the Postpalatial period, see also Hayden 1981). Further developed in later publications, McEnroe's (1982, 1990) emphasis on vernacular and domestic architecture was a welcome addition to studies that kept, for too long, a narrow focus on palatial or prestige buildings.

Concomitantly, the second half of the twentieth century witnessed continued excavations at major sites such as Knossos, Malia, and Phaistos, projects reviving early excavations at Pseira, Gournia, Mochlos, Kommos, Zakros, and Palaikastro, but also, the discovery of new sites such as, among others, Chania, Galatas, and Petras. Enumerating all the publications resulting from these projects is beyond the scope of this introductory chapter but it is clear that these discoveries prompted renewed attempts at defining the Minoan built environment.[2] These mostly took the form of a series of conferences. The first one was rather unsurprisingly dedicated to the palaces (Hägg and Marinatos 1987) whereas the second dealt with the so-called 'villas' (Hägg 1997). Although these conferences displayed a continuing interest in architectural forms, functions, materials, and techniques, their distinctive character is related to the more interpretive nature of most of the contributions. At that time, descriptive accounts were in fact more frequently associated with considerations of the economy and socio-political organization of Minoan Crete.[3] Apart from early papers (Hutchinson 1950; Branigan 1972), the first volume addressing, in part, the issue of Minoan urbanism was also published in the same period (Darcque and Treuil 1990). Dedicated to the domestic built environment in the Bronze Age Aegean, it featured, in equal proportions, papers focusing on vernacular Minoan architecture and on urban features, layout, iconography, and terminology.

Another characteristic that all these publications share is that they remained somewhat atheoretical. Usually associated with Classics or History of Art departments all over the world, Aegean archaeology remained relatively impervious to conceptual debates in anthropological archaeology or other social sciences (Sanders 1986).[4] There are of course exceptions. In the late 1970s to early 1980s, Donald Preziosi developed a complex semiotic approach to the Minoan built environment (Preziosi 1979, 1983). He was interested in understanding the underlying logic in the relationships among the spaces and rooms of the Cretan Bronze Age built environment. In other words, he was the first to investigate the configurational or structural properties of Minoan architecture. Behavioural approaches to the built environment, championed by Amos Rapoport (1982), also influenced Donald Sanders in his study of Myrtos Fournou Korifi (Sanders 1985, 1990). By detailing how different morphological characteristics of these prepalatial structures were built to constrain movement and perception and how they contributed to frame particular social interactions, he was one of the first Minoan scholars to acknowledge the importance of an explicit interest in the recursive interplays between space and society. Some years later, a strong postprocessual slant can be found in Louise Hitchcock's (2000) contextual analysis of Minoan architecture in which she argued for the importance of combining architectural and artefactual analyses. Her main argument was that, although common characteristics existed in the Bronze Age Cretan built environment, they were often overemphasized. This, in her opinion, had the effect of masking local or regional idiosyncrasies, normalizing the potentially polysemic qualities of Minoan architecture.

With the turn of the century, Minoan archaeology became increasingly concerned with a broad critical re-assessment of its early twentieth-century origins and the general narratives and models they inspired (e.g. Driessen et al. 2002; Hamilakis 2002; Schoep et al. 2012), thereby acknowledging its current limitations while welcoming innovative research perspectives (e.g. Cappel et al. 2015). So far, this 'Minoan turn' has mostly taken the form of debates on the socio-political organization of Bronze Age Crete that challenge traditional views and provided new interpretive frameworks. Although many approaches to the Minoan built environment remain relatively traditional with a strong focus on building materials and techniques, basic formal descriptions, and functional evaluations (e.g. Glowacki and Vogeikoff-Brogan 2011; McEnroe 2010; Shaw 2009), recent years have also witnessed a renewed interest in urbanism (Branigan 2001; Preston and Owen 2009) and, more generally, a series of major advances that call for a new synthesis.

1.2. RECENT PERSPECTIVES ON MINOAN ARCHITECTURE AND URBANISM

We would argue that Minoan scholarship has come into its own in recent years—that is to say, increasingly self-aware of the remarkable potential offered by its rich and varied material culture, with its extraordinary temporal resolution and spatial variability. Moreover, the subfield can also now claim to occupy an unprecedented epistemological position in its history, with the recent growth of interpretive perspectives that largely avoid polarized debates. One key example of this is in discussion of Minoan socio-political organization (Driessen 2010; Knappett 2009; Schoep and Knappett 2004; Whitelaw 2004b; Whitelaw 2012) where collective (i.e. heterarchical/bottom-up) and autocratic (i.e. hierarchical/top-down) processes are less and less presented as antithetical or mutually exclusive. This tendency has also recently found expression in considerations on built space. Indeed, among specialists, there is an extremely broad range of approaches but most importantly a willingness to bridge the gap between those seemingly farthest apart (e.g. Letesson 2009; Palyvou forthcoming). This actually follows a broader convergence in architectural and urban studies where structural/analytical (e.g. Hillier 2014; Batty 2013) and phenomenological/synergistic (e.g. Seamon 2012) approaches to relationality interact (Hillier 2005; Netto, Paschoalino, and Pinheiro 2010; Seamon 2013). Practically, in recent studies of the Minoan built environment and particularly in this volume, this tendency is manifest through a combined focus on the spatial configuration of particular urban and architectural elements and how their formal and structural features might have been experienced and could have contributed to constrain or frame different types of behaviours and practices (see chapters 5, 7–9, and 12–14; see also section 1.4).

Therefore, building on the distinctive epistemological openness of recent Minoan studies, this volume stands as a collaborative manifesto towards a more comprehensive research programme for the analysis of Cretan Bronze Age architecture and urbanism. As such, it draws on four additional advances that can be singled out in recent studies of the Minoan built environment. First, geographically speaking, new excavations and intensive surveys allow detailed regional approaches (Haggis 2005; Watrous 2012; Whitelaw et al. 2006–7), often undermining a monolithic narrative that had previously been uniformly imposed across the island. Second, these fine-grained analyses are often strengthened by a diachronic focus, with a critical assessment of the developmental stages of the built environment that supersedes interpretations based on an erroneous amalgamation of these phases (Herva 2005; Letesson 2013; Letesson 2014). Third, the fundamentally multi-scalar nature of the built environment is more systematically advocated (Cunningham 2001; Knappett 2009). Minoan scholars indeed pay more attention to the need to articulate the micro-scale of individual buildings (households) with the meso-scale of settlement (communities) and the macro-scale of island-wide spatial organizations (polities) (Knappett 2011; Whitelaw 2012). Finally, many of these studies are also characterized by the adoption of analytical tools and methods, often borrowed from other disciplines such as urban studies and complexity sciences (e.g. GIS, visual analyses, space syntax, formal networks, agent-based approaches and simulations—Bevan and Wilson 2013; Knappett, Evans, and Rivers 2008; Knappett, Rivers, and Evans 2011; Paliou 2011; Jusseret et al. forthcoming). Generally speaking, these new approaches are evidence of a progressive dismantling of the Classical understanding of the built environment (Sanders 1986) which remained prominent in Aegean archaeology long after anthropological insights influenced ceramic, lithic, and paleoenvironmental studies. As hinted at in section 1.1, this 'Classical' or 'Cartesian' understanding of built space has been characterized by a strong focus on the stylistic, morphological, and functional properties of architecture and urbanism with little consideration of the complex interplay between society and space. Furthermore this Vitruvian conception of what architecture can be divided into (Firmitas/Structure, Utilitas/Function, and Venustas/Form) has notably been criticized by Batty and Longley (1994) for being detrimental to the analysis of the internal dynamics of spatial configuration. So far, these advances in studies of Minoan architecture and urbanism have been developed in relative isolation and a pooling of these innovative approaches is particularly timely. By bringing together international scholars whose research focuses on the Cretan Bronze Age built environment as well as on theory and methods in spatial analyses, this volume essentially aims at providing a first step in this direction. In other words, it presents a critical assessment of these studies and methodologies and the new research perspectives they open up, while emphasizing how they can be integrated more effectively and applied to a wider range of evidence. In our opinion, for such an integration to take place, a logical framework is indeed needed to articulate bottom-up empirical studies with top-down analytical/interpretive approaches (see section 1.5).

1.3. THE MULTIPLE SCALES OF THE MINOAN BUILT ENVIRONMENT

Approaching Cretan Bronze Age architecture and urbanism necessarily implies considering different scales: buildings, towns, and settlement patterns exist at different spatial levels. If acknowledging their existence is now relatively common in Minoan archaeology (see section 1.2), understanding how the micro-scale of buildings, the meso-scale of agglomerations, and the macro-scale of regional/island-wide settlement distribution are articulated is less straightforward (Knappett 2011). This triple and yet integrated conception of the built environment is at the core of the organization of this volume. Each of its parts gathers contributions with a particular focus on one of these scales and opens with an editorial introduction which summarizes: a) the type of data existing in the Minoan built environment (the constraints they impose and opportunities they open), b) how they can be approached in terms of theory and methods, c) the type of research question that can be addressed, and d) how this particular scale can be related to the others and why it is useful to do so, while contextualizing the individual papers.

Together with their distribution in space, Minoan buildings and agglomerations also developed through time. A diachronic and comprehensive approach to the developmental stages of Minoan architecture can be found in McEnroe (2010) but, where urbanism is concerned, such an account has to be gathered from a variety of sources. Of course, investigating ancient towns and cities is far from an easy task. For various practical reasons, archaeologists can rarely excavate settlements in their entirety, making it very difficult to characterize a town or a city as a whole (Marcus and Sabloff 2008b: 336). This limitation is often reinforced by the temporal conundrum of the urban palimpsest, a notion that goes back to Freud's (1962) metaphor of Rome to describe the multi-layered structure of the human mind. The fact that many settlements were occupied during very long periods of time and witnessed multiple construction phases clearly complicates a fine-grained appraisal of the interplay between earlier and later levels. It also means, challengingly for the archaeologist, that earlier elements can constrain later patterns of use, but can also be adapted, reconfigured, and reinterpreted in later phases. Furthermore, acknowledging the importance or the impact of the earlier phases of an urban environment is not the same as being able to document such processes archaeologically (Renfrew 2008: 41–4; Smith 2007: 39–40). Although urban plans are still mostly conveniently treated as if they were 'snapshots', i.e. realities from a single time period (Marcus and Sabloff 2008: 325), rather than complex constructional histories (on Minoan architecture, see Herva 2005), a general narrative nonetheless prevails in Minoan scholarship that one can partly trace back to the founding years of Cretan Bronze Age archaeology. Nevertheless, recent work has strengthened this general agreement on the chronological succession of broad developmental stages (e.g. McEnroe 2010; Palyvou 2009) which, although it cannot encompass the full spectrum of regional variabilities and divergent trajectories (see section 1.2), is worth summarizing here, as a preamble to part II (see chapter 6). In the Neolithic (*c.* 7000–3100/3000 BCE) and most of the Prepalatial period (Early Minoan I–IIB), only hamlets and villages would have existed in Minoan Crete (McEnroe 2010: 9). Although it is widely accepted that urban environments emerged from such small settlements, it is only fairly recently that the Late Prepalatial and the beginning of the Protopalatial period (Early Minoan III–Middle Minoan IB) have been presented as the true turning point in the progressive urbanization of Minoan Crete, at least in major sites such as Knossos, Phaistos, and Malia (Bevan 2010: 44; McEnroe 2010; Whitelaw 2012). During this period, these sites all produced evidence of large-scale construction activities and a massive settlement expansion (Whitelaw 2012: 165). The particularly well preserved and documented architectural remains at Malia are our best evidence of a whole new scale of urban built environment, but they are not the only data we have. Since the Final Neolithic, most notably at Knossos and Phaistos, open-air spaces associated with domestic structures seem to have been of prime importance and the nexus of collective activities (Todaro 2012; Tomkins 2012). Referring to Vasiliki, Palyvou (2009: 73) argued that, as early as EM II, a slightly more elaborate form of organized public open-air space can be found in a settlement context, at exactly the same time as the first evidence for the existence of a building with a second storey. At Myrtos Fournou Korifi too, there is also some distinct, extra-household public activity space.

As Whitelaw (2012: 165) demonstrated, although urbanization started as a rapid change, the process also continued well into, if not throughout, the Protopalatial and Neopalatial periods, at least at Knossos. The Protopalatial period is characterized by the development of the palaces and, concomitantly, the formalization of many features such as courts, streets,[5] raised walkways, and stepped areas, as well as blocks of buildings, all giving a clear urban appearance to many Minoan settlements (Palyvou 2009: 74–6; McEnroe 2010: 45–67; see also chapters 7–9 and 15). This phenomenon soon impacted settlements throughout the island and reached its acme during the Neopalatial period, during which demographic pressure is attested by a clear island-wide pattern of settlement growth—both in terms of surface area and density of buildings (Whitelaw 2001). Considered since Evans (1928: 559) the Minoan 'Golden Age', this period saw the dramatic development of pre-existing settlements but also the foundation of new ones of which the scale is currently difficult to assess, such as at Makrygialos (Palyvou 2009: 77). Concomitantly, a common architectural vocabulary and recurring patterns of spatial organization penetrated all built environments even if local and regional idiosyncrasies did not disappear (Cunningham 2001; Driessen 1989–90; Letesson 2009; McEnroe 2010: 93–116). Although Driessen and Macdonald's (1997) hypothesis of an LM IB twilight has been rightfully criticized (McEnroe 2010: 113–14; Warren 2012), the end of the Neopalatial period still corresponds to the final stage of many urban settlements in Minoan Crete.

During the Final Palatial and Postpalatial times (LM II–LM IIIC), the Minoan urban phenomenon finally withered, with most settlements showing a drastic reduction in terms of scale and architectural elaboration, especially in the latest phases of the period (i.e. LM IIIB–LM IIIC). Although Knossos, Chania, Haghia Triada, and Palaikastro certainly remained major towns with monumental architecture until at least LM IIIA, many other surviving settlements had by then lost their former grandeur and are usually considered as having reverted to the status of villages (McEnroe 2010: 117–45).[6] This tendency towards smaller settlements continued in LM IIIC where other concerns—such as the need for a defensible position—then clearly seemed to prevail in many cases (McEnroe 2010: 147–59). It is only much later with the rise of the first Cretan poleis that an urban character can again be attested on the island (Gaignerot-Driessen and Driessen 2014).[7]

Although contributions in this volume are neither organized according to these developmental stages nor cover in detail this full chronological span, they are still worth considering within this broader chronological framework. In fact, whereas some of them clearly adopt a diachronic perspective of variable breadth (chapters 5, 7, 9, and 12), others are more strictly focused on one particular period (chapters 3, 4, 8, 10, 13, and 14) and, as such, they help refine, nuance, or develop this temporal development for particular periods and/or specific regions or sites.

The existence of different temporal scales is not only manifested in the fact that the built environment developed through time; it can also be experienced in different temporalities. Buildings and agglomerations are more than static products; they are co-implicated in inherently dynamic processes and are an integral part of the spatiality of Minoan life.

1.4. WRITING MINOAN SOCIETY SPATIALLY

As claimed by proponents of the 'spatial turn' initiated in human geography some twenty-five years ago and in many other disciplines since, space is clearly more than the backdrop of human actions or the materialization of social norms. Relationships of mutual influence exist between space and society. In the past decades, the active potential of architectural space has been amply demonstrated, both by studies focusing on the patterns of movements and interactions triggered by architectural configuration and by those on the phenomenological and cognitive dimensions of the recursive interactions between built space and human beings (see section 1.2). Furthermore, more recently, a real 'urban turn' is happening. A wide range of data on various aspects of city life (such as land use, urban infrastructure, and rates of socio-economic activities) are now amassed and made available. These so-called 'big data' can be mobilized to trace the dynamics of the social, spatial, and infrastructural networks that form cities and the sets of actions, interactions, and transactions that make urban environments function (or dysfunction) socially, economically, and ecologically (Batty 2013). As Luis Bettencourt (2013) put it cities are 'social reactors': in cities, social interactions and outputs (positive or negative) increase at a much faster rate than the increase in population. Recently, settlement scaling and its increasing returns have also been documented in ancient agglomerations (Ortman et al. 2014; Ortman et al. 2015). Such processes actually corroborate earlier ideas, such as Jane Jacobs' (1969) 'agglomeration economy' or Edward Soja's (2003) 'stimulus of urban aggregation'. These authors basically underlined that town and cities, now and in history, make a difference: they afford and catalyse behaviours and events (good or bad) to an unprecedented degree.

But how exactly can this idea of spatial agency help us to understand ancient built environments and Minoan architecture and urbanism more specifically? Thinking of the active potential of Minoan built space has both an exploratory and an explanatory potential. By creating a sense of buildings and towns doing something, this perspective is actually a very powerful heuristic device: it really invites us to mobilize our relatively static data (remains of buildings and settlements) into a more dynamic framework. We also argue that paying due attention to the different scales of the built environment and how they are articulated also contributes to a less static understanding of Minoan buildings, agglomerations, and settlement patterns. But, practically, if built environments are complex realities and cannot be reduced to their physical properties, what Charles Landry (2000: 119–20, 133–4) calls their 'hard infrastructures', how can archaeologists, given the fragmentary nature of their data sets, grasp their 'soft infrastructures', that is to say the communicative or interactive networks they host and frame?

1.5. TRACING THE DYNAMICS OF MINOAN BUILT ENVIRONMENT

We argue that adopting such a perspective requires a particular attention to data collection and description in parallel with a critical understanding of interdisciplinary trends in data mobilization and interpretation. In other words, as evoked in section 1.3, tracing the dynamics of the Minoan built environment requires an explicit integration of bottom-up empirical studies with top-down analytical/interpretive approaches. For this reason, the various contributions in this volume are articulated along these two complementary lines. There is, first, a pressing need for a very detailed control of the data (i.e. architectural and urban remains). Central to this debate is the issue of standardization, the documentation of our evidence in similar ways both at the level of data collection (excavations and surveys, but also re-examination of long-published architectural remains) and data description. Through various case-studies at the level of buildings and settlements, this volume therefore aims to provide systematic frames of reference for the assessment of materials and techniques, layout, evidence for use (i.e. artefact distribution and spatial organization), and chronological phasing (usually resulting from combinations of observations on the three previous categories). Practically, these thick and detailed qualitative and quantitative descriptions are instrumental in developing the developmental/diachronic and trans-scalar perspective advocated here. More specifically, they provide the basic material for the analytical, comparative, and interpretive models that are highlighted in the more methodologically/theoretically geared contributions. Although this inductive process is central to our argument, we also suggest that data mobilization imposes particular constraints on our data sets. In other words, the requirements of the analytical models presented in the volume encourage us to manipulate our descriptive categories in different ways. Indeed, computational tools and quantitative analyses enforce standardization in the description and analysis of information and foster a dynamic understanding of our static data sets (e.g. phasing of building projects, urban growth, movement/interactions within and between settlements). Furthermore, often strengthened by data coding, comparative analyses also feature prominently in the volume. They seek to refine our understanding of commonalities and variations among Minoan building types (chapters 3–5), settlements, regional entities, and territorial patterns (chapters 7 and 12) but also highlight the distinctiveness of these elements by focusing on cross-cultural contrasts and similarities (chapters 13 and 14). This explicit and critical iterative process between data collection/description and data mobilization is at the core of this volume and provides, in our opinion, a solid basis on which to investigate how the Cretan Bronze Age built space was co-implicated in various social, political, economic, or ritual processes.

In other words, the integrated approach to the Minoan built environment developed through these different chapters also intends to address challenging issues and provide stimulating and innovative perspectives on Cretan Bronze Age society at different scales. As Driessen puts it (see chapter 5), tracing the dynamics of the Minoan built environment is also a way of 'peopling the past'. For example, at the level of individual buildings, different chapters deal with questions of residential composition (chapters 4, 5, and 7), gender differentiation (chapter 5) and circulation/interaction patterns (chapters 5, 8, and 13); at the settlement level, the focus is on the institutional structure of towns and the spatial distribution of specific activities (chapters 7, 9, and 15), the urban configuration of streets, buildings and open spaces and the opportunities for movement, occupation and interaction (chapters 8, 9, and 15), the labour cost of building projects (chapter 4), and, more generally, the socio-political organization of urban communities (chapters 7, 9, and 15); and finally, at the regional, island-wide and Aegean levels, discussions concentrate on settlement hierarchies and their impact on the flows of people, ideas, and things, but also on the interplays between urbanization, political geography, and social complexity (see chapters 7, 12, and 15). Other contributions focus more closely on cultural diffusion, contextualizing the Minoan built environment in a broader sphere of 'international' contacts, influences or patterns (see chapters 13 and 14). More fundamentally though, the volume, with its trans-scalar organization (see section 1.3), also sets out to address the relationships between these different scales and levels of socio-political organization (house groups to urban communities and civic/palatial entities, towns to polities, regional hierarchies to Crete and the broader East Mediterranean) and to document the interplays between these top-down and bottom-up processes. As mentioned above, key to this interpretive goal is the idea that built environments need to be envisioned dynamically, as active processes rather than static by-products of economic or socio-political realities.

1.6. FUTURE CHALLENGES

By illustrating how systematic approaches to Bronze Age Cretan buildings and towns can be articulated across different scales, we hope that the assembled contributions will also open up new avenues for future research on this distinctive built environment. There is, of course, great potential for further diachronic and comparative approaches, such as analyses on the transition between Bronze and Iron Ages with, for example, the potential influence of Minoan open spaces on the formal development of the first Greek agoras on Crete (Gaignerot-Driessen forthcoming); or detailed studies of spatial configuration in larger samples of building and agglomeration plans for particular periods; or further assessments of architectural phasing in very complex multiperiod buildings. As we argued in section 1.2, what all these types of approaches have in common is their reliance on systematic, detailed and standardized data description. Although this might seem rather evident, failing to explicitly acknowledge this simple fact often leads to a belief that particular patterns, no matter how site specific or circumstantial they are, easily translate into relevant interpretations (see chapter 15).

Luckily, in recent years, numerous sites have been published in great detail (e.g. Kommos, Pseira, Mochlos), while the results of earlier excavations are progressively made available (e.g. at Knossos, Phaistos, Zakros, Palaikastro, Haghia Triada) in parallel with the emergence of new—usually smaller scale—projects (e.g. at Sissi, Papadiokambos, Malia Quartier Pi, Palaikastro) or ongoing reinvestigations of certain sites (e.g. Malia Bâtiment Dessenne, Gypsadhes, Zominthos). Although many of the important sites in this partial list are not featured in this volume, the architectural material they produced, often extremely well documented or currently under study, offers countless potential case-studies. With this volume, we also hope to illustrate how such remains of the Minoan built environment can be mobilized, the types of methodological approaches and theoretical background that can help us make sense of them, and how considering them across different scales can bring us closer to understanding the complex dynamics of Minoan buildings and towns.

Another potential impact of a conscious integration of empirically driven, methodologically geared, and theoretically engaged approaches to Cretan Bronze Age architecture and urbanism is that it can, hopefully, have a lasting impact on data collection in Minoan archaeology. Several contributions in this volume illustrate that the ways in which we record what we excavate or survey constrain both the detail of the description and the degree of the interpretation of our data sets. Again, this might sound like stating the obvious, but an awareness of how and why architectural and urban remains can be approached analytically might actually foster new types of data recording or illustrate the importance of particular site or architectural features whose importance or meaningfulness might not seem straightforward at first. Some examples, among many others, would be the size of the various stones, cobbles, and blocks and their variable organization within walls—both in elevation and plan—that can be used in creating wall typologies with a diagnostic potential (Walsh and McDonald 1986)[8] or are instrumental in evaluations of the costs of building projects (see chapters 4 and 9); or the accurate distribution of all mudbrick fragments found in and around a building that are too often disregarded although they can clearly contribute to a better assessment of a wall's elevation. Several chapters also illustrate that such a detailed type of recording can also be conducted a posteriori, sometimes many years after a site was originally excavated (e.g. chapters 4 and 9; see also Devolder 2016; Devolder et al. forthcoming), architectural remains usually having a better resilience than other archaeological material once unearthed.

More broadly, as rich as our data sets are, they remain almost totally underexploited beyond the disciplinary boundaries of Aegean archaeology. Developing the types of analyses advocated here could therefore also help align studies of the Minoan built environment with ongoing analyses of architecture and urbanism over thousands of years in many parts of the globe. Such an approach is a necessary step for making sense of the high variability of buildings, towns, and cities across the ages and could therefore, as argued by Smith (2012), serve to provide a long-term and worldwide perspective on the urban phenomenon that may well help scholars and policy-makers to understand issues relating to modern cities, both in terms of the numerous challenges they face and the considerable opportunities they offer.

NOTES

1. Graham was curator at the Royal Ontario Museum; Shaw, professor in the Department of Fine Arts of the University of Toronto where his students, McEnroe and Begg, also received their PhD.
2. The discovery of the Protopalatial remains of Malia is here particularly noteworthy (e.g. Amourretti 1970; Poursat 1978, 1996; van Effenterre 1980; van Effenterre and van Effenterre 1969) in the sense that, without this town, our knowledge of the Middle Bronze Age Cretan architecture and urbanism would have been seriously hampered.
3. In that regard, Renfrew and Cherry's influence was instrumental in polarizing scholarly interests in Aegean archaeology around the emergence of socio-political complexity (e.g. Renfrew 1972; Renfrew and Cherry 1986; see also Barrett and Halstead 2004).
4. It is nonetheless clear that, most notably through Renfrew's (1972) work, processual approaches percolated through Aegean archaeology.

5. Apart from very few examples in Malia that could have been laid out as early as EM IIB (Devolder et al. forthcoming) or EM III–MM IA (van Effenterre 1980: 216 and 266; contra, see Poursat 1988), most street systems in Minoan sites were actually built at the beginning of the Protopalatial period (McEnroe 2010: 60; Gomrée 2013).
6. McEnroe (2010: 139) noted that, during the Postpalatial period, 'several new villages or new neighborhoods in old settlements were established', while adding that 'none has been completely published, and all of them are confusing'. Most settlements of this period nonetheless share similar traits: they were usually small, presented very simple house plans—where a Mycenaeanizing influence was often highlighted, walled courtyards used as cook-sheds or work areas, but also very distinctive shrines with standardized cult equipment (Gaignerot-Driessen and Driessen 2014; Langohr 2009; McEnroe 2010: 136–45).
7. Although the 30+ha of occupation at Knossos during the Protogeometric period could speak in favour of an urban character (Whitelaw, pers. comm.).
8. In Minoan archaeology, both Shaw (2009: 56–8) and McEnroe (1990: 197–8, 2010: 36–8) attempted some sort of categorization mostly based on walls elevation (coursing, bonding techniques, use of mud/earth/mortar, shape and size of stones, etc). Strangely enough, to our knowledge, no typological categorization was ever explicitly made for Minoan masonry while considering walls in plan rather than in elevation. Furthermore, so far, there has been no systematic attempt to generalize or compare such categories across different sites or regions. For Mycenaean architecture, this perspective was adopted by Walsh and McDonald (1986) and, together with an evaluation of elevation features, led to the definition of four different types that they use as diagnostic phasing elements. It is also worth noting that although such information is sometimes recorded during excavation, it rarely appears in the final publications.

REFERENCES

Amouretti, M.-C. 1970. *Fouilles exécutées à Mallia. Le centre politique. La Crypte Hypostyle*. Paris: Paul Geuthner.

Barrett, J. C. and P. Halstead (eds). 2004. *The Emergence of Civilization Revisited*. Oxford: Oxbow Books.

Batty, M. 2013. *The New Science of Cities*. Cambridge, MA: MIT Press.

Batty, M. and P. Longley. 1994. *Fractal Cities: A Geometry of Form and Function*. London: Academic Press.

Begg, I. 1975. 'Minoan Storerooms in the Late Bronze Age'. Unpublished PhD thesis. University of Toronto.

Bettencourt, L. 2013. 'The Origin of Scaling in Cities'. *Science* 340.6139: 1438–41.

Bevan, A. 2010. 'Political Geography and Palatial Crete'. *Journal of Mediterranean Archaeology* 23.1: 27–54.

Bevan, A. and A. Wilson. 2013. 'Models of Settlement Hierarchy based on Partial Evidence'. *Journal of Archaeological Science* 40.5: 2415–27.

Boyd Hawes, H., B. E. Williams, R. B. Seager, and E. H. Hall. 1908. *Gournia, Vasilike and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete*. Philadelphia, PA: American Exploration Society Free Museum of Science and Art.

Branigan, K. 1972. 'Minoan Settlements in East Crete'. In *Man, Settlement and Urbanism*, edited by P. J. Ucko, R. Tringham, and G. W. Dimbleby. Cambridge, MA: Schenkman: 751–9.

Branigan, K. 2001. *Urbanism in the Aegean Bronze Age*. London: Sheffield Academic Press.

Cappel, S., U. Günkel-Maschek, and D. Panagiotopoulos (eds). 2015. *Minoan Archaeology: Perspectives for the 21st century* (Aegis 8). Louvain-la-Neuve: Presses universitaires de Louvain.

Cunningham, T. 2001. 'Variations on a Theme: Divergence in Settlement Patterns and Spatial Organization in the Far East of Crete during the Proto- and Neopalatial Periods'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 72–86.

Darcque, P. and R. Treuil (eds). 1990. *L'habitat égéen préhistorique*. Paris: École Française d'Athènes.

Devolder, M. 2016. 'The Protopalatial State of the Western Magazines of the Palace at Malia (Crete)'. *Oxford Journal of Archaeology* 35.2: 141–59.

Devolder, M., I. Caloi, and T. Gomrée. Forthcoming. 'Le Bâtiment Dessenne: Étude et nouveaux sondages'. *Bulletin de Correspondance Hellénique* 139.2.

Driessen, J. 1989–90. 'The Proliferation of Minoan Palatial Architectural Style (I) Crete'. *Acta Archaeologica Lovaniensia* 28–9: 3–23.

Driessen, J. 2010. 'Spirit of Place: Minoan Houses as Major Actors'. In *Political Economies of the Aegean Bronze Age*, edited by D. J. Pullen. Oxford: Oxbow Books: 35–65.

Driessen, J. and C. F. Macdonald. 1997. *The Troubled Island: Minoan Crete before and after the Santorini Eruption* (Aegaeum 17). Liège: Université de Liège.

Driessen, J., I. Schoep, and R. Laffineur (eds). 2002. *Monuments of Minos: Rethinking the Minoan Palaces. Proceedings of an International Workshop held in Louvain-la-Neuve, 2001* (Aegaeum 23). Liège: Université de Liège.

Evans, A. 1928. *The Palace of Minos at Knossos II*. London: Macmillan.

Freud, S. 1962. *Civilization and its Discontents*. New York: W.W. Norton.

Gaignerot-Driessen, F. Forthcoming. *De l'occupation postpalatiale à la cité grecque: le cas du Mirambello (Crète)* (Aegaeum 40). Leuven: Peeters.

Gaignerot-Driessen, F. and J. Driessen. 2014. *Cretan Cities: Formation and Transformation* (Aegis 7). Louvain-la-Neuve: Presses universitaires de Louvain.

Glowacki, K. T. and N. Vogeikoff-Brogan (eds). 2011. *Στέγα: The Archaeology of Houses and Households in Ancient Crete*. Princeton, NJ: American School of Classical Studies at Athens.

Gomrée, T. 2013. 'La voirie dans les villes minoennes en Crète orientale et à Cnossos (Minoen Moyen I–Minoen Récent I)'. Unpublished doctoral thesis. Université Lumière Lyon 2.

Graham, J. W. 1962. *Palaces of Crete*. Princeton, NJ: Princeton University Press.

Hägg, R. (ed.). 1997. *The Function of the 'Minoan Villa': Proceedings of the Eighth International Symposium at the Swedish Institute at Athens, 6–8 June 1992*. Stockholm: Svenska Institutet i Athen.

Hägg, R. and N. Marinatos (eds). 1987. *The Function of the Minoan Palaces: Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984*. Stockholm: Svenska institutet i Athen.

Haggis, D. 2005. *Kavousi I. The Archaeological Survey of the Kavousi Region*. Philadelphia, PA: INSTAP Academic Press.

Hamilakis, Y. 2002. *Labyrinth Revisited: Rethinking 'Minoan' Archaeology*. Oxford: Oxbow Books.

Hayden, B. J. 1981. 'The Development of Cretan Architecture from the LM IIIA Through the Geometric Periods'. Unpublished PhD dissertation. University of Pennsylvania.

Herva, V.-P. 2005. 'The Life of Buildings: Minoan Building Deposits in an Ecological Perspective'. *Oxford Journal of Archaeology* 24.3: 215–27.

Hillier, B. 2005. 'Between Social Physics and Phenomenology: Explorations towards an Urban Synthesis'. In *5th International Space Syntax Symposium Proceedings. Volume 1*. Delft: TU Delft: 3–23.

Hillier, B. 2014. 'Spatial Analysis and Cultural Information: The Need for Theory as well as Method in Space Syntax Analysis'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 19–48.

Hitchcock. L. 2000. *Minoan Architecture: A Contextual Analysis*. Jönsered: Paul Aströms Förlag.

Hutchinson, R. W. 1950. 'Prehistoric Town Planning in Crete'. *Town Planning Review* 21.3: 199–220.

Jacobs, J. 1969. *The Economy of Cities*. New York: Random House.

Jusseret, S., A. Chliaoutakis, A. Sarris, and J. Wainwright. Forthcoming. 'An Agent-based Modelling Approach to Minoan Land Use in the Malia-Lasithi Region, Crete (Greece)'. In *Proceedings of the Computer Applications and Quantitative Methods in Archaeology Annual Conference 2014*.

Knappett, C. 2009. 'Scaling Up: From Household to State in Bronze Age Crete'. In *Inside the City in the Greek World. Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 14–26.

Knappett, C. 2011. *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*. Oxford: Oxford University Press.

Knappett, C., T. Evans, and R. Rivers. 2008. 'Modelling Maritime Interaction in the Aegean Bronze Age'. *Antiquity* 82.318: 1009–24.

Knappett, C., R. Rivers, and T. Evans. 2011. 'The Theran Eruption and Minoan Palatial Collapse: New Interpretations Gained from Modelling the Maritime Network'. *Antiquity* 85.329: 1008–23.

Landry, C. 2000. *The Creative City: A Toolkit for Urban Innovators*. London: Earthscan.

Langohr, C. 2009. *Peripheria. Étude régionale de la Crète au Minoen Récent II–IIIB (1450–1200 av. J.-C.). 1. La Crète centrale et occidentale* (Aegis 3). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2009. *Du phénotype au génotype: analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2013. ‘Minoan Halls: A Syntactical Genealogy’. *American Journal of Archaeology*, 117.3: 303–51.

Letesson, Q. 2014. ‘From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete’. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Manning, S. 2010. ‘Chronology and Terminology’. In *The Oxford Handbook of the Bronze Age Aegean*, edited by E. Cline. Oxford: Oxford University Press: 11–28.

Marcus, J. and J. A. Sabloff. 2008. ‘Cities and Urbanism: Central Themes and Future Directions’. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. A. Sabloff. Santa Fe, NM: School for Advanced Research Press: 323–36.

McEnroe, J. 1979. ‘Minoan House and Town Arrangement’. Unpublished PhD thesis. University of Toronto.

McEnroe, J. C. 1982. ‘A Typology of Minoan Neopalatial Houses’. *American Journal of Archaeology*, 86: 4–19.

McEnroe, J. C. 1990. ‘The Significance of Local Styles in Minoan Vernacular Architecture’. In *L’habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Paris: École française d’Athènes: 195–202.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Netto, V., M. Paschoalino, and M. Pinheiro. 2010. ‘Social Networks in the City, or the Urban Condition of Coexistence’. In *V!RUS*, 04 [online]. <http://www.nomads.usp.br/virus/virus04/?sec=4&item=5&lang=en> [accessed 31/3/2017].

Ortman, S. G., A. H. F. Cabaniss, J. O. Sturm, and L. M. A. Bettencourt. 2014. ‘The Pre-History of Urban Scaling’. *PLOS ONE* 9.2: e87902.

Ortman, S. G., A. H. F. Cabaniss, J. O. Sturm, and L. M. A. Bettencourt. 2015. ‘Settlement Scaling and Increasing Returns in an Ancient Society’. *Sciences Advances* 1.1: e1400066.

Paliou, E. 2011. ‘The Communicative Potential of Theran Murals in Late Bronze Age Akrotiri: Applying Viewshed Analysis in 3D Townscapes’. *Oxford Journal of Archaeology* 30.3: 247–72.

Palyvou, C. 2009. ‘The Cities of Crete during the Minoan Age’. In *A History of the Greek City*, edited by A. Lagopoulos. Oxford: Archeopress: 71–86.

Palyvou, C. Forthcoming. *Daidalos at Work: The Realities of a Myth*. Philadelphia, PA: INSTAP Academic Press.

Poursat, J.-C. 1978. *Fouilles exécutées à Malia. Le Quartier Mu I. Introduction générale.* Paris: Paul Geuthner.

Poursat, J.-C. 1988. ‘La ville Minoenne de Malia: recherches et publications récentes’. *Revue Archéologique* 1988: 61–82.

Poursat, J.-C. 1996. *Fouilles exécutées à Malia. Le Quartier Mu III. Artisans minoens: les maison-ateliers du Quartier Mu*. Paris: Paul Geuthner.

Preston, L. and Owen, S. (eds). 2009. *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period.* Oxford: Oxbow Books.

Preziosi, D. 1979. *The Semiotics of the Built Environment: An Introduction to Architectonic Analysis*. Bloomington, IN: Indiana University Press.

Preziosi, D. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: Mouton.

Rapoport, A. 1982. *The Meaning of the Built Environment: A Nonverbal Communication Approach*. Tucson, AZ: University of Arizona Press.

Renfrew, C. 1972. *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium B.C.* London: Methuen.

Renfrew, C. 2008. 'The City through Time and Space: Transformations of Centrality'. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. A. Sabloff. Santa Fe, NM: School for Advanced Research Press: 29–51.

Renfrew, C. and J. F. Cherry (eds). 1986. *Peer Polity Interaction and Socio-political Change*. Cambridge: Cambridge University Press.

Sanders, D. H. 1985. 'Behavior and the Built Environment: An Interpretive Model for the Analysis of Architecture in an Archaeological Context and its Testing on Material from the Aegean Bronze Age Site of Myrtos, Crete'. Unpublished PhD dissertation. Columbia University.

Sanders, D. H. 1986. 'Architecture, the Neglected Artifact'. In *Problems in Greek Prehistory*, edited by E. B. French and K. A. Wardle. Bristol: Short Run Press: 489–99.

Sanders, D. H. 1990. 'Behavioural Conventions and Archaeology: Methods of the Analysis of Ancient Architecture'. In *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study*, edited by S. Kent. Cambridge: Cambridge University Press: 43–73.

Schoep, I. and C. Knappett. 2004. 'Dual Emergence: Evolving Heterarchy, Exploding Hierarchy'. In *The Emergence of Civilization Revisited*, edited by J. C. Barrett and P. Halstead. Oxford: Oxbow Books: 21–37.

Schoep, I., P. Tomkins, and J. Driessen (eds). 2012. *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*. Oxford: Oxbow Books.

Seamon, D. 2012. 'Place, Place Identity, and Phenomenology'. In *The Role of Place Identity in the Perception, Understanding, and Design of the Built Environment*, edited by H. Casakin and F. Bernardo. London: Betham Science Publishers: 3–21.

Seamon, D. 2013. 'Environmental Embodiment, Merleau-Ponty, and Bill Hillier's Theory of Space Syntax: Toward a Phenomenology of People-in-Place'. In *Rethinking Aesthetics: The Role of Body in Design*, edited by R. Bhatt. New York: Routledge: 204–13.

Shaw, J. W. 1973. *Minoan Architecture: Materials and Techniques*. Rome: Istituto poligrafico dello stato.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. 2nd edn. Padua: Aldo Ausilio.

Shaw, J. W. 2015. *Elite Minoan Architecture: Its Development at Knossos, Phaistos, and Malia*. Philadelphia, PA: INSTAP Academic Press.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6.1: 3–47.

Smith, M. E. 2012. 'The Role of Ancient Cities in Research on Contemporary Urbanization'. *UGEC Viewpoints* 8: 15–19.

Soja, E. 2003. 'Writing the City Spatially'. *City: Analysis of Urban Trends, Culture, Theory, Policy, Action* 7.3: 269–80.

Todaro, S. 2012. 'Craft Production and Social Practices at Prepalatial Phaistos: The Background to the First Palace'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 195–235.

Tomkins, P. 2012. 'Behind the Horizon: Reconsidering the Genesis and Function of the "First Palace" at Knossos (Final Neolithic IV–Middle Minoan IB)'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 32–80.

van Effenterre, H. 1980. *Le palais de Mallia et la cité minoenne. Étude de synthèse.* Rome: Edizioni Dell' Ateneo.

van Effenterre, H. and M. van Effenterre. 1969. *Fouilles exécutées à Mallia. Le centre politique I. L'agora (1960–1966).* Paris: Paul Geuthner.

Walsh, V. and W. McDonald. 1986. 'Greek Late Bronze Age Domestic Architecture: Toward a Typology of Stone Masonry'. *Journal of Field Archaeology* 13.4: 493–9.

Warren, P. 2012. 'The Apogee of Minoan Civilization: Some Remarks on the Final Neopalatial Period, Late Minoan IB'. In *Philistor: Studies in Honor of Costis Davaras*, edited by E. Mantzourani and P. P. Betancourt. Philadephia, PA: INSTAP Academic Press: 255–72.

Watrous, L. V. 2012. *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity*. Philadelphia, PA: INSTAP Academic Press.

Whitelaw, T. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Whitelaw, T. 2004b. 'Alternative Pathways to Complexity in the Southern Aegean'. In *The Emergence of Civilisation Revisited*, edited by J. Barrett and P. Halstead. Oxford: Oxbow Books: 232–56.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 114–76.

Whitelaw, T., M. Bredaki, and A. Vasilakis. 2006–7. 'The Knossos Urban Landscape Project: Investigating the Long-Term Dynamics of an Urban Landscape'. *Archaeology International* 10: 28–31.

Part I

2

Architecture

Building Dynamics at the Micro-Scale

Quentin Letesson and Carl Knappett

In this section we tackle individual buildings. For domestic structures, the scale is that of the household, whereas for more monumental buildings—such as the palaces or the so-called 'villas'—the association with a particular social group is still a matter of great debate, although the term 'corporate group' has been recently put forward (Driessen 2010; Schoep and Tomkins 2012).

Bronze Age Crete presents an extremely rich architectural landscape; indeed, many buildings are sufficiently well preserved to allow detailed studies not only of their layout but also of their construction techniques (Devolder 2014; Shaw 2009). The discovery of the town of Akrotiri, buried under metres of tephra, has also provided plenty of evidence for architectural features—most notably perishable elements such as timber and roofing material—that have only left scant traces on Crete (Palyvou 2005; Tsakanika-Theochari 2006).

Nevertheless, as for any other scale (see chapters 6 and 11), gaps in our archaeological data necessarily impede some analyses at the micro-scale. Often, in Minoan archaeology, the built environment has been partially recorded, and data collection varies from extremely detailed at some sites to almost non-existent for the large-scale early excavations of the beginning of the twentieth century. Furthermore, in terms of data resolution, Neopalatial architectural remains outweigh by far those of other periods, both in terms of quantity and quality. With the exception of the small settlements of Myrtos Fournou Korifi (Sanders 1990; Warren 1972) and Vasiliki (Zois 1992), Early Minoan architectural remains are relatively scarce. The situation is even more problematic for Middle Minoan buildings. Although Malia produced incredibly well-preserved remains of a Middle Bronze Age town, with buildings like Quartier Mu (Poursat 1978, 1996), the Bâtiment Dessenne (Devolder, Déderix, and Fadin 2012–13; Devolder, Caloi, and Gomrée forthcoming), the Agora (van Effenterre and van Effenterre 1969), and the Crypte Hypostyle

(Amouretti 1970), we are not as fortunate with other sites. Middle Bronze Age remains were nonetheless excavated in many areas of the island, but later constructions often make detailed investigations almost impossible. Apart from unusual and isolated structures like those at Chamaizi (Lenuzza 2011) and Agia Photia (Tsipopoulou 1988), other interesting buildings, such as at Monastiraki (Kanta 2006), are unfortunately still largely unpublished (see also Letesson 2014: 71). We definitely have a better picture of Postpalatial architecture (Hayden 1981; Langohr 2009; McEnroe 2010), with a series of small settlements such as Kavousi Vronda (Gesell and Day 2009), Monastiraki Halasmenos (Rupp 2014), and Karphi (Wallace 2010), but also with monumental buildings erected during this period at Kommos (Shaw and Shaw 2006) and Haghia Triada (Cucuzza 2003; Privitera 2015), extensive reoccupation of earlier sites such as Chania (Hallager and Hallager 2011) or Palaikastro, and large—possibly communal—structures in north central Crete, like Quartier Nu at Malia (Driessen et al. 2008) and Building CD at Sissi (Driessen et al. 2012; see also chapter 5).

Despite these clear limitations, it is still possible to conduct analyses by starting from better documented cases and working one's way down to less well-preserved buildings. Furthermore, numerous excavations are regularly improving data resolution. Sites like Papadiokambos, Priniatikos Pyrgos, or Sissi indeed produced interesting buildings, whereas continuous work or reconsideration of old excavations in settlements such as Gournia (see chapter 9), Knossos, Malia, Palaikastro, Phaistos, and Zakros provide invaluable information and an increasing amount of data. Although this wealth of information cannot be denied, there is a pressing need for a very detailed control of the data. Central to this debate is the issue of standardization: the documentation of our evidence in similar ways both at the level of data collection (excavations and surveys, but also re-examination of long-published architectural remains) and data description. Concomitant issues of terminology might seem trivial but they simply cannot be avoided if fruitful comparative approaches are to be developed. The search for commonalities and variations across our samples—of particular architecture features and buildings, but also of towns or regional settlement patterns (see Parts II and III)—has logically always been a major research topic in studies of the Minoan built environment (e.g. Driessen 1989–90; McEnroe 1982). What is less common, though, is an explicit concern for some sort of standardization that would facilitate comparisons while remaining open to the idiosyncrasies of various sites or building traditions. This type of approach (see chapter 15) is of course inevitable if different building types with varying degrees of preservation are studied across many sites and in a diachronic perspective.

Such a genealogical approach to architecture that documents the development and modifications of built forms through time has become more and more prominent in recent studies of Minoan architecture (e.g. Driessen 2010;

Letesson 2013; Shaw 2011, 2015). Buildings have life histories which consist in 'the unfolding of their relations with both human and non-human components of their environments.' (Ingold 2000: 187; see also Herva 2005). This focus on processes rather than products can be achieved in various ways. At the most elementary level, one can trace chronological phasing within buildings. In that regard, several contributions in this volume make use of or discuss the diagnostic potential of particular materials, construction techniques, room types, or urban features (see chapters 4, 5, and 9). A dynamic understanding of the built environment also implies that architecture is considered co-implicated in complex entanglements with people and material assemblages (Hodder 2012; see also chapter 13). During their progressive constitution, negotiation, and reproduction, these assemblages 'in some senses work[ed] in concert to provide contexts for action and perception' (Knappett 2011: 69). With that in mind, it might be worth reminding ourselves that if we want to make sense of the dynamics of built environments at the micro-scale, spatial configuration and artefact distribution clearly gain in being considered together (e.g. Romanou 2007; Letesson 2015; see also chapter 5).

Thick and detailed qualitative and quantitative descriptions of buildings and their material assemblages are indeed instrumental; not only because they provide evidence for use or function but, more importantly, because they lay the basis for addressing crucial issues pertaining to Minoan social organization. For example, the size and occupation area of various buildings has often been mobilized to discuss residential composition (Whitelaw 2001; Driessen 2010; see also chapters 5 and 7), whereas the articulation between spaces within buildings has been investigated to discuss potential circulation patterns and interfaces between residents and visitors or different categories of users (Letesson 2009; Palyvou 1987; Preziosi 1983). More recently, focusing on building layout and the contextual recurrences of particular objects, Driessen (2010, 2012), in line with his ambitious reinvestigation of Minoan socio-political organization in light of the 'House' concept, has questioned the role of women and the importance of maintenance activities both in everyday life and more episodic ritual practices (see chapter 5).

The three papers comprising this first part of the volume all fit in this broader attempt to understand how buildings can be approached as arenas of social interaction but also how they were co-implicated in dynamic processes that structured Minoan society. Starting with a detailed analysis of architectural features, construction details and layout of the buildings in Block M at Palaikastro and proceeding through comparisons with other buildings of the same period (later Middle and earlier Late Bronze Age), Cunningham questions the practicality of different techniques and spatial arrangements that are usually praised as notable achievements of Minoan architects (chapter 3). Highlighting contradictions between design and execution, poor choice of materials, or obsolescence testified by repurposing, he goes on to contrast polite architecture with the more pragmatic qualities of vernacular buildings. Central to his argument is the suggestion that Minoan elites displayed their status through the conscious manipulation of architectural forms and techniques that are perhaps not always indicative of—or even practically adapted to—practices and spatial behaviours often accepted rather unquestioningly in Minoan archaeology. In her methodological contribution, Devolder refines her energy investment approach, addresses some recent critiques, and details its ins and outs through a series of case-studies (chapter 4). Adapted from the pioneering work of Abrams (1994) in Maya architecture, her updated approach offers a general framework for measuring the labour invested in Minoan construction projects. Practically, it evaluates the working hours required for the completion of tasks such as collecting, transporting, manufacturing, and assembling raw materials (stone, brick, mortar, and wood). Through a detailed analysis of this architectural chaîne opératoire combined with population estimates, she then addresses the relationship between necessary and available workforce, in other words, the impact of building projects on communities. Comparing various buildings across the island during the Neopalatial period, she also discusses control over particular resources and specialized craftsmanship. In chapter 5, starting with large Late Minoan IIIB residences at Sissi (Building CD) and Malia (Quartier Nu) and working his way down to architectural contexts from earlier periods, Driessen approaches buildings as arenas of social interactions, as ‘Houses’, material counterparts of corporate groups that he considers the primary units of production and consumption in Bronze Age Crete. Combining ethnographic parallels and insights from Linear B tablets from Pylos and Knossos with a special attention to spatial organization and the distribution of artefacts within these buildings, he stresses how gender-related maintenance activities and commensal practices might have played a crucial role in structuring ‘Houses’ and, across different scales, Minoan society more generally.

Investigations at the micro-scale of buildings clearly have the potential to shed light on bottom-up processes, everyday practices, and local variations that certainly were important constituents of Minoan society. And yet, an exclusive focus on the micro-scale runs the risk of blinding us to more global processes. When considering socio-political complexity, for example, we surely need to pay close attention to the interlinkages between different scales and the possible causal links from one scale to another (Knappett 2009). The same logic holds true where the Minoan built environment is concerned: an explicit attention to scale is of paramount importance. Indeed, the real challenge is to develop a multi-scale framework that would allow these levels to be clearly related and articulated. Parts II and III of this volume exemplify how observations and analyses at the micro-scale can be mobilized at more global levels of study. For example, typo-morphological approaches to architectural remains—that is, the detailed description of a whole range of spatial forms and their properties (morphology) and the subsequent identification of common characteristics and recurrent patterns across them (typology)—is a necessary step in analyses of town planning (meso-scale; see chapter 15); they also provide invaluable data for addressing the development of settlement through time (see chapters 7 and 9). Detailed studies of the spatial and chronological distribution of particular building techniques and architectural forms are also essential for the evaluation of macro-scale processes of cultural diffusion and the interplay between tradition and innovation (see chapters 13 and 14). Conversely, the papers of this first part of the volume clearly exemplify how the constitution, maintenance, and everyday use of the built environment at the micro-scale cannot be apprehended without considering the wider context (urban, regional, but also environmental, etc.) in which buildings were implanted but also how they took part in societal dynamics structured across different levels, from households and corporate groups to communities and polities.

REFERENCES

Abrams, E. M. 1994. *How the Maya Built their World: Energetics and Ancient Architecture*. Austin, TX: University of Texas Press.

Amouretti, M.-C. 1970. *Fouilles exécutées à Mallia: Le centre politique. La Crypte Hypostyle*. Paris: Paul Geuthner.

Cucuzza, N. 2003. 'Il volo del grifo: osservazioni sulla Haghia Triada "micenea"'. *Creta Antica* 4: 199–272.

Devolder, M. 2014. *Construire en Crète minoenne: Une approche énergétique de l'architecture néopalatiale.* Leuven: Peeters.

Devolder, M., I. Caloi, and T. Gomrée. Forthcoming. 'Le Bâtiment Dessenne. Étude et nouveaux sondages'. *Bulletin de Correspondance Hellénique* 139.2.

Devolder, M., S. Déderix, and L. Fadin. 2012–13. 'Recherches aux "Magasins Dessenne" à Malia'. *Bulletin de Correspondance Hellénique* 136–137.2: 869–73.

Driessen, J. 1989–90. 'The Proliferation of Minoan Palatial Architectural Style (I) Crete'. *Acta Archaeologica Lovaniensia* 28–9: 3–23.

Driessen, J. 2010. 'Spirit of Place. Minoan Houses as Major Actors'. In *Political Economies of the Aegean Bronze Age*, edited by D. J. Pullen. Oxford: Oxbow Books: 35–65.

Driessen, J. 2012. 'Chercher la femme: Identifying Minoan Gender Relations in the Built Environment'. In *Minoan Realities. Approaches to Images, Architecture, and Society in the Aegean Bronze Age* (Aegis 5), edited by D. Panagiotopoulos and U. Günkel-Maschek. Louvain-la-Neuve: Presses universitaires de Louvain: 141–64.

Driessen, J., H. Fiasse, M. Devolder, P. Haciguzeller, and Q. Letesson. 2008. 'Recherches spatiales au Quartier Nu à Malia (MR III)'. *Creta Antica* 9: 93–110.

Driessen, J., I. Schoep, M. Anastasiadou, F. Carpentier, I. Crevecoeur, S. Déderix, M. Devolder, F. Gaignerot-Driessen, S. Jusseret, C. Langohr, Q. Letesson, F. Liard, A. Schmitt, C. Tsoraki, and R. Veropoulidou. 2012. *Excavations at Sissi II. Preliminary Report on the 2011 Campaign* (Aegis 6). Louvain-la-Neuve: Presses universitaires de Louvain.

Gesell, G. C. and L. Day. 2009. *Kavousi IIA: The Late Minoan IIIC Settlement at Vronda. The Building on the Summit.* Philadelphia, PA: INSTAP Academic Press.

Hallager, E. and B. P. Hallager. 2011. *The Greek-Swedish Excavations at the Agia Aikaterini Square Kastelli, Khania 1970–1987 and 2001. IV:1 The Late Minoan IIIB:1 and IIIA:2 Settlements.* Stockholm: Narayana Press.

Hayden, B. J. 1981. 'The Development of Cretan Architecture from the LM IIIA through the Geometric Periods'. PhD dissertation. University of Pennsylvania.

Herva, V.-P. 2005. 'The Life of Buildings: Minoan Building Deposits in an Ecological Perspective'. *Oxford Journal of Archaeology* 24.3: 215–27.

Hodder, I. 2012. *Entangled: An Archaeology of the Relationships between Human and Things*. Oxford: Wiley-Blackwell.

Ingold, T. 2000. *The Perception of the Environment: Essays in Livelihood, Dwelling and Skills*. London: Routledge.

Kanta, A. 2006. 'Monastiraki, a Minoan Palatial Centre in the Valley of Amari, Crete'. In *Monastiraki 1: Missione Monastiraki, Campagne 2002/2004*, edited by A. Kanta and M. Marazzi. Naples: Herder.

Knappett, C. 2009. 'Scaling Up: From Household to State in Bronze Age Crete'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 14–26.

Knappett, C. 2011. *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*. Oxford: Oxford University Press.

Langohr, C. 2009. *Peripheria: Étude régionale de la Crète au Minoen Récent II–IIIB (1450–1200 av. J.-C.). 1. La Crète centrale et occidentale* (Aegis 3). Louvain-la-Neuve: Presses universitaires de Louvain.

Lenuzza, V. 2011. 'The Whole is a Freak: A Reassessment of the Spatial Organization of the Oval House at Chamaizi, Siteia'. In *Στέγα. The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 59–70.

Letesson, Q. 2009. *Du phénotype au génotype: analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2013. 'Minoan Halls: A Syntactical Genealogy'. *American Journal of Archaeology*, 117.3: 303–51.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Letesson, Q. 2015. 'Fire and the Holes: An Investigation of Low-Level Meanings in the Minoan Built Environment'. *Journal of Archaeological Method and Theory* 22: 713–50.

McEnroe, J. C. 1982. ‘A Typology of Minoan Neopalatial Houses’. *American Journal of Archaeology* 86: 4–19.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Palyvou, C. 1987. ‘Circulatory Patterns in Minoan Architecture’. In *The Function of the Minoan Palaces: Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska Institutet i Athen: 195–203.

Palyvou, C. 2005. *Akrotiri, Thera: An Architecture of Affluence 3,500 Years Old*. Philadelphia, PA: INSTAP Academic Press.

Poursat, J.-C. 1978. *Fouilles exécutées à Malia: Le Quartier Mu I. Introduction générale*. Paris: Paul Geuthner.

Poursat, J.-C. 1996. *Fouilles exécutées à Malia: Le Quartier Mu III. Artisans minoens: les maison-ateliers du Quartier Mu*. Paris: Paul Geuthner.

Preziosi, D. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: Mouton.

Privitera, S. 2015. *Haghia Triada III: The Late Minoan III Buildings in the Villagio*. Athens: Scuola archaeologica italiana di Atene.

Romanou, D. 2007. ‘Residence Design and Variation in Residential Group Structure: A Case Study, Mallia’. In *Building Communities: House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fischer, and J. Whitley. London: British School at Athens: 77–90.

Rupp, D. W. 2014. ‘Foretelling the Future: Innovative Elements in Settlement Planning and Building Types at Late Minoan IIIC Halasmenos (Monastiraki–Ierapetra, Crete)’. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond: Proceedings of a Colloquium in Memory of Frederick E. Winter, Athens, 22–23, June 2012*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 161–91.

Sanders, D. 1990. ‘Behavioral Conventions and Archaeology: Methods for the Analysis of Ancient Architecture’. In *Domestic Architecture and the Use of Space*, edited by S. Kent. Cambridge: Cambridge University Press: 43–73.

Schoep, I. and P. Tomkins. 2012. ‘Back to the Beginning for the Early and Middle Bronze Age on Crete’. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 1–31.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. Padua: Aldo Ausilio.

Shaw, J. W. 2011. ‘Tracing the Ancestry of the Minoan Hall System’. *Annual of the British School at Athens* 106: 141–65.

Shaw, J. W. 2015. *Elite Minoan Architecture: Its Development at Knossos, Phaistos, and Malia*. Philadelphia, PA: INSTAP Academic Press.

Shaw, J. W. and M. Shaw. 2006. *Kommos V: The Monumental Minoan Buildings at Kommos*. Princeton, NJ: Princeton University Press.

Tsakanika-Theochari, E. 2006. ‘The Structural Role of Timber in Wall Construction of Palatial Buildings in Minoan Crete’. PhD dissertation. N.T.U.A. Athens. (In Greek).

Tsipopoulou, M. 1988. '*Αγία Φοτιά Σητείας: Το Νέο Εύρημα*'. In *Problems in Greek Prehistory: Papers Presented at the Centenary Conference of the British School of Archaeology at Athens, Manchester April 1986*, edited by E. B. French and D. E. H. Wardle. Bristol: Bristol Classical Press: 31–47.

van Effenterre, H. and M. van Effenterre. 1969. *Fouilles exécutées à Mallia: Le centre politique I. L'agora (1960–1966)*. Paris: Paul Geuthner.

Wallace, S. 2010. *Ancient Crete: From Successful Collapse to Democracy's Alternatives, Twelth to Fifth Centuries* BC. Cambridge: Cambridge University Press.

Warren, P. 1972. *Myrtos: An Early Bronze Age Settlement on Crete*. London: Thames and Hudson.

Whitelaw, T. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Zois, A. A. 1992. 'Vasiliki'. In *The Aerial Atlas of Ancient Crete*, edited by J. W. Myers, E. E. Myers, and G. Cadogan. London: Thames and Hudson: 276–81.

3

Best Laid Plans

An Archaeology of Architectural Anomalies in Bronze Age Crete

Tim Cunningham

3.1. INTRODUCTION

Approaches to Minoan architecture (Graham 1962; Preziosi 1983; Hitchcock 2000; Shaw 2009, 2015; Letesson 2009; McEnroe 2010) have focused on its positive qualities, and since Evans's excavations in the early years of the twentieth century the perceived modernity of Minoan architecture has been manifest both in scholarly discourse (Farnoux 1993; Schoep 2010: 222) and in popular representations in various media. Sophisticated, delightful, and above all planned—for while bull-leaping, labyrinths, and even kingship have all come under sceptical scrutiny, the existence of a Daedalus, at least as the personification of the creative genius of Minoan architecture, has been tacitly accepted. Any argument over the idea that Minoan architecture was designed, and furthermore designed with goals well appreciated today (e.g. maximizing light and air circulation, controlling for privacy, providing aesthetic pleasure) tends to be over the degree to which such planning can be demonstrated or proven from the existing evidence. That the goal itself, designed or planned building, was likely to have been desirable or effective is not usually questioned.

Likewise, there are signs of civic or town planning, to the extent of a conceptual order imposed on the built form, implying an abstract higher level authority controlling private or lower level space, or at least the needs of the town superseding those of the individual structures within (Cunningham 2001; Buell 2014; see also chapter 9). And again, while we may disagree over the extent or penetration of such authority, or the appropriateness of the terminology, the idea that town planning might have had a *deleterious* effect on social bonding is rarely, if ever, considered.

This is interesting, since in studies of architecture and town planning in modern times, at least since the 1960s and 1970s, it has become increasingly clear that planning towns and buildings is extremely hard and that even the best intentioned, most competent, and well-supported efforts not only often fail but regularly have the opposite effect as was intended. These inquiries have resulted in seminal works such as Jacobs' *Death and Life of Great American Cities* (Jacobs 1961) and Christopher Alexander's *A Pattern Language* (Alexander et al. 1977) and *The Timeless Way of Building* (Alexander 1979), and also attempts at a more analytical breakdown of the problems such as Bill Hillier's *Social Logic of Space* (Hillier and Hanson 1984) and *Space is the Machine* (Hillier 2007). From such works it follows that when confronted with evidence of architectural planning both of buildings and towns, one should consider, and perhaps even expect, the products of this planning to have failed in significant ways to fulfil their purpose. Of course, there are major pitfalls of anachronistic projection and assumption surrounding any attempt to guess at intent; and even actual function can be difficult to assess, let alone original purpose. With that caveat in mind, there are also many things one can assume—that a drain should transport liquids effectively, that walls should shield and support, etc. In this chapter then I would like to consider Minoan architecture and town planning from a different perspective, looking not at their successes but at their flaws.

It will be seen that in many cases these 'failures' in building or planning accompany attempts to create or emulate elite forms of architecture and that elite architecture on Crete was especially concerned with what we might term ornament; a preoccupation with form and symbolic communication that took precedence at times over purely technical or structural concerns. This focus on ornament was expressed in some cases by the rendering of ornamental details as structural, and by the use of potentially deceptive techniques to alter or obscure actual materials or structural members. This feature of Minoan building may have grown out of the particular requirements of nascent urbanism in Bronze Age Crete.

Minoan urbanism was largely an architectural phenomenon. This is true archaeologically speaking, since building remains comprise our principal evidence, but it may also reflect something of the nature of Minoan urbanism itself. Outside Knossos, Minoan 'cities' are really only towns, and there is no evidence for massive and dense populations, or extreme specialization, or any of the other attributes usually found in (admittedly generally modern) urban environments. We call it urbanism in part because they built towns that *looked* like cities, with close-set multi-storey buildings, paved streets, coordinated drainage, etc., but again, outside of Knossos (and perhaps even there) there is no evidence for external demographic pressure forcing the growth of this urban fabric, or providing support in its sustenance—the surrounding settlements do not grow along with the larger towns, and agriculture was probably carried out by the inhabitants of these towns in their immediate surroundings (Branigan 2001; see also chapter 7). Towns such as Gournia, Zakros, Mochlos, Pseira, or Kommos are impressively constructed but demographically little more than villages (Branigan 2001: 39); and yet these comprise, by some estimates (Branigan 2001: 48), 60 per cent of the population. There is no obvious explanation why people would nucleate in towns and in such elaborate buildings; they could just as easily have lived in more scattered and simpler single-storey dwellings and hamlets as they generally have on Crete for most of the time it has been inhabited.

Urbanization at times gets treated almost like a horticultural phenomenon—the right soil, climate, a bit of luck and up it springs, but this cannot explain in any useful way a phenomenon like Minoan urbanism which transformed human settlement on Crete into something not seen again until modern times. What might distinguish Minoan urbanism from other early examples is often relegated to conditions or constraints (see chapter 7). What these constraints are acting on, be it simply inexorable population growth or an idealized hypothetical platonic form of early urbanism, is left largely unsaid. I suspect that the ultimate shape of Minoan urbanism had at least as much to do with the desires and goals of its people and leaders as with any constraints or obstacles they might have faced. Just as the form of Minoan buildings and towns suggests that they have been designed, so too their very existence, that is the existence of this early urbanism on Crete, was a kind of choice, a deliberate, self-conscious act, an ornament of sorts on earlier versions of Bronze Age Cretan society.

3.2. THE DATA

The idea for this paper came from the study of Block M at Palaikastro, particularly the South-east Building, which seemed to combine on the one hand features reminiscent of elite buildings in Central Crete, and on the other several clear mistakes in planning and construction. Because we lack sufficient textual or understandable iconographic evidence, many of the suppositions made about Minoan society have relied on ‘reading’ the architecture, and this paper will be no different.

The Minoan remains at Palaikastro (Fig. 3.1), especially concentrated around the hollow known as Roussolakkos, comprise a large town by the standards of the Cretan Bronze Age, and with estimates ranging from 15 to 25 hectares at its height it is generally considered to be one of the four or five largest towns on the island (Whitelaw 2001: 29; Branigan 2001: 39; Cunningham 2007: 99). Archaeologically, Palaikastro is known for its fine buildings and wide streets, and its lack so far of a palace or administrative

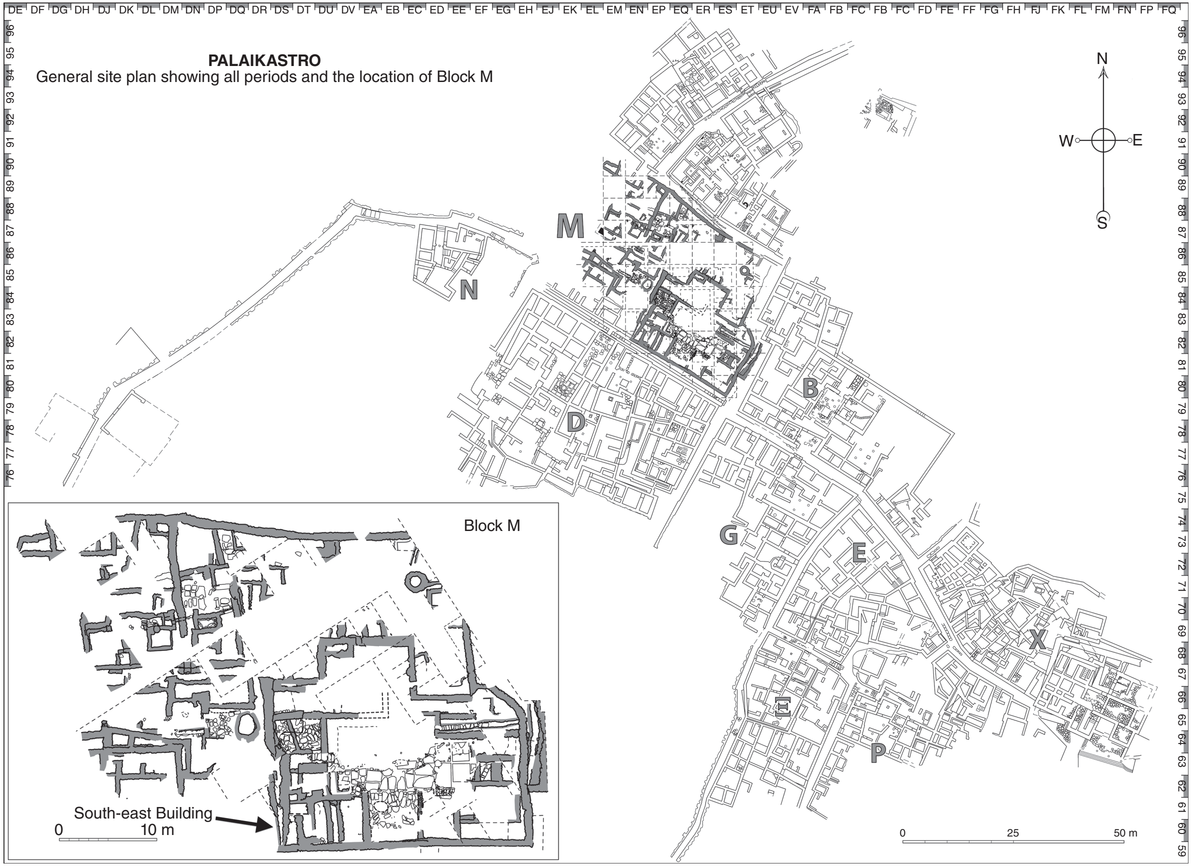

PALAIKASTRO
General site plan showing all periods and the location of Block M
DE DF DG DH DJ DK DL DM DN DP DQ DR DS DT DU DV EA EB EC ED EE EF EG EH EJ EK EL EM EN EP EQ ER ES ET EU EV FA FB FC FB FC FD FE FF FG FH FJ FK FL FM FN FP FQ
96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59
N
W
E
S
M
N
B
D
G
E
X
Ξ
P
Block M
South-east Building
0
10 m
0
25
50 m

Fig. 3.1. Plan of Palaikastro, portions excavated during 1902–6, 1962–3, and 1986–2003. Block M shown in inset (plan by author, S. Goddard, J. Driessen, and H. Comyn; reproduced with permission of the British School at Athens).

centre. Due to the horizontal exposure of the site over the years (in part because of the failure to find said palace), Palaikastro, along with Gournia and Pseira, has been one of the best examples of Minoan urban architecture and town planning.

Palaikastro was excavated by the British School at Athens in four major campaigns.[1] Most of the town was excavated from 1902 to 1906 by R. C. Bosanquet and R. M. Dawkins, and only preliminary reports published. There are no phase plans or comprehensive stone-by-stone plans available. Furthermore, the site was looted for building materials after the cessation of excavation in 1906 and 1907; Bosanquet backfilled the site in 1908 as a result, documenting a minimum of 300 missing ashlar blocks. A small part of the site was left open; further degradation took place, and during the 1962–3 campaign Sackett and Popham found it necessary to restore a number of walls known from plans and photographs but no longer present on site. These include the Main Street facades of blocks Beta and Gamma, and the east part of Delta, as well as a number of internal walls. There is no comprehensive plan to indicate which walls were restored. Generally, we are left with the outline plan and occasional descriptions of wall construction, especially when ashlar was found.

For the more recent excavations, good stone-by-stone plans are available, along with fairly detailed wall descriptions for the various buildings. Elevations are few but the absence is made up for by numerous photographs. Generally the biggest obstacle to categorizing or cataloguing the architectural remains from the Sackett–MacGillivray–Driessen excavations is chronological; most of the buildings had many overlapping phases and reconstruction often obscured distinctions between these phases. Attempts to classify the architectural remains beyond the obvious (e.g. ashlar) need to be on an ad hoc basis.

Also, what remains are foundations. Exactly how, and of what, the upper portions of walls were constructed is at best a matter of educated guesswork, at worst just guesswork.[2] Many walls have been conserved and their current state is no longer necessarily a reliable indicator of their original composition.

I will focus on the South-east Building of Block M, Palaikastro because of the relative clarity of the remains, which were recently excavated and fully published and which preserve a relatively clear and limited sequence of architectural phases, with only one major episode of reconstruction.

3.3. BUILDINGS

Block M (Fig. 3.2) lies along the north side of Main Street, in the area of town occupied by 'blocks'—larger building complexes found on or close to Main

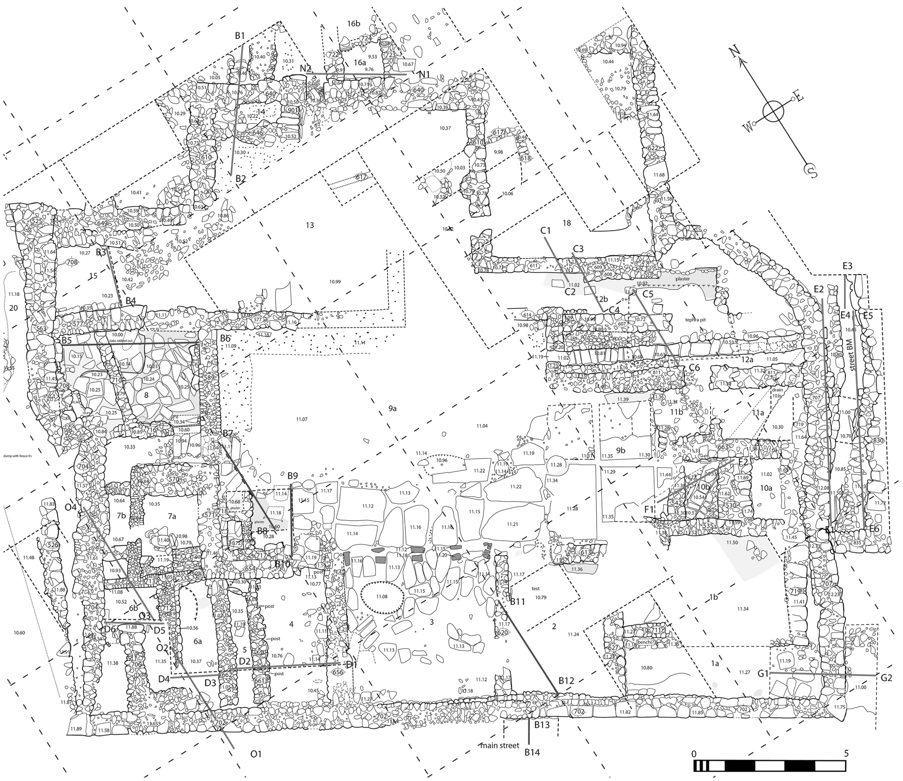


Fig. 3.2. South-east Building Block M (plan by author and J. Driessen; reproduced with permission of the British School at Athens).

Street (Cunningham 2007: 99). Within Block M we find three discrete buildings, the North-west, South-west, and South-east (Knappett and Cunningham 2012). The South-east Building as it appears on the plan was first constructed during the Middle Minoan IIB ceramic phase, with a subsequent phase of renovation during MM III. Fragments of earlier walls and deposits uncovered in soundings suggest that no comparable earlier structure existed; along with evidence from tests in Main Street and elsewhere, this suggests that the erection of this building was linked to a site-wide episode of construction during which time the street grid was laid out and the town first acquired its ‘urban’ character (Knappett and Cunningham 2012: 82–3).

The South-east Building stands out by virtue of several features not common (or even unknown) elsewhere at the site—in plan, with sunken rooms laid out around a rectangular central court, and in materials, with a variety of fine stone and plaster details. These anomalous (for Palaikastro) features seem to derive from a more central Cretan architectural koine and the building has been interpreted as linked to or at least influenced by Knossos (MacGillivray et al. 1998: 233; Driessen 1999: 232–3; Knappett and Cunningham 2012: 321). This building is therefore most clearly a product of deliberate design (which is not to imply that other buildings are not). While various schemes of categorizing architecture as 'polite' vs 'vernacular' or 'built' vs 'designed' etc. can be proposed (for a discussion see Letesson 2014: 50–1), at some point most buildings have aspects that are consciously chosen, and hence designed. But the South-east Building takes the notion of design a step further, and there are elements crucial to the plan of the building where the essentially aesthetic desire or design qua ornament outstripped or even subsumed the basic craft of building, or vernacular architecture, which tends to favour the practical.

For example, visible on the plan is the long, wide drain (10m × 0.6m) running from the north-east corner of the court out to Street BM where it empties into the covered street drain on the west side of that street (Fig. 3.3).

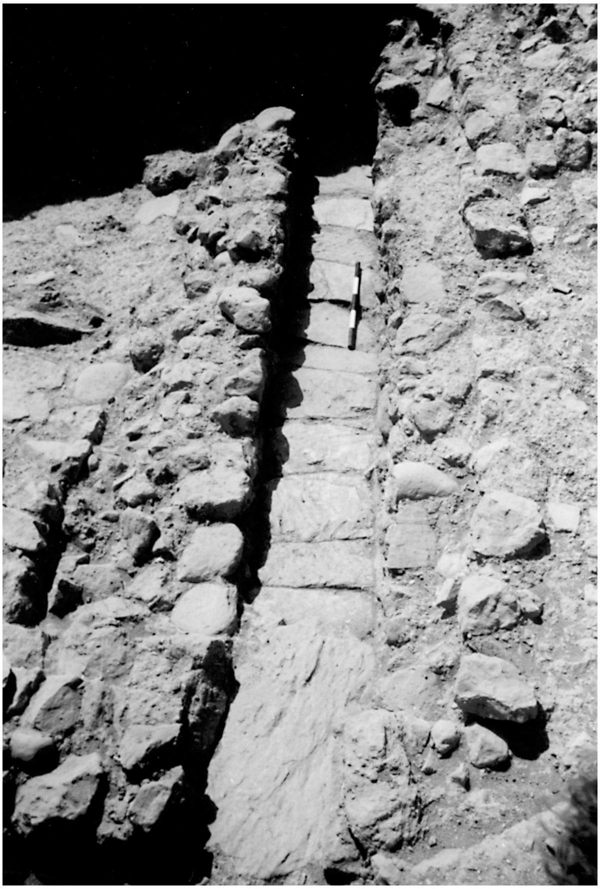


Fig. 3.3. Drain (photograph by J. Driessen; reproduced with permission of the British School at Athens).

This drain is carefully made, lined with close fitting slabs, and runs in a straight line to a pre-existing junction where an earlier drain (visible on the plan in Room 10b) had likewise joined the street drain. Planned, therefore, as part of the drainage system for this area of town, built with care, covered with slabs, and large enough to carry a substantial volume of water, the drain was pitched far too steeply—with a drop of 1 in 12. In modern times, 1 in 48 (or four times flatter) is considered standard; Minoan drains vary, but anything steeper than 1 in 25 may cause problems, as the water will flow too quickly and cause erosion. The drain was subsequently adapted, with a terracotta channel being set above the floor of the drain at a shallower angle and with a curving spout at its far end to control the flow of water into the street drain (Fig. 3.4). Knowing how steeply to pitch a drain is the sort of basic knowledge that

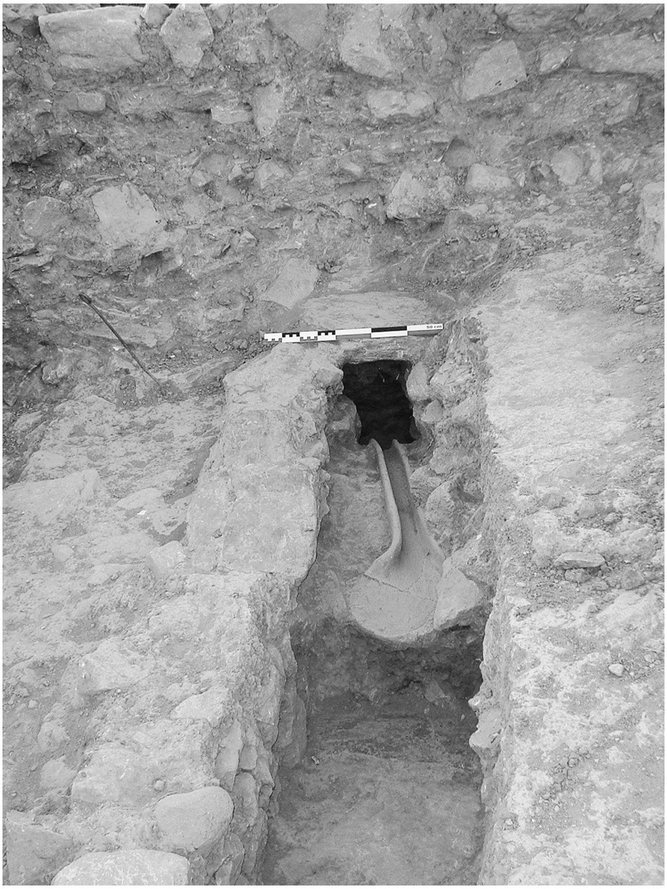


Fig. 3.4. Modified drain (photograph by J. Driessen; reproduced with permission of the British School at Athens).

experienced builders would have, and of the many drainage features and gutters extant from the site, none had such a drastic slope. It is curious that one of the most impressive drainage features on the site is also one of the least well planned, from a practical standpoint.

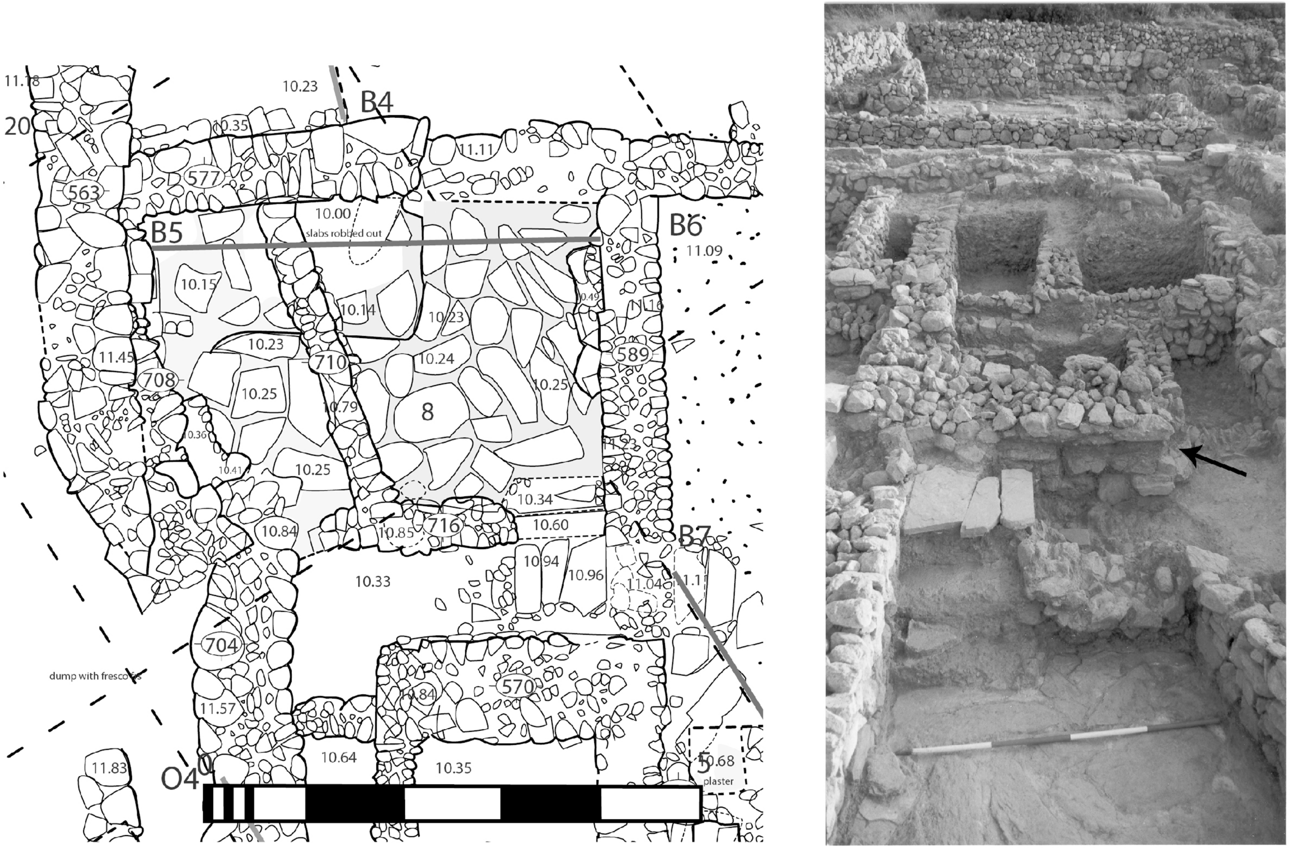
At the north-west corner of the court is Room 8. Originally a large (3.5m × 5m at least) space, sunken 80–85 cm below the court level, Room 8 boasted a very carefully made floor of purple schist slabs set in white plaster (a style known as 'mosaiko' and considered typical of Knossos) (Fig. 3.5). The plaster ran up the walls as well and a shallow sunken area suggests that the function of the room involved liquids. The steps leading down into the room however, though plastered, were made of clay. The room was subsequently remodelled and while we cannot know for certain in what way it failed, there are indications that it suffered from flooding, as the eroded steps, silty deposits, and possibly undermined east wall suggest; the remodelling entailed building a narrow supporting wall down the middle of the room which, with regular supports around the perimeter, seems to have supported a raised floor level presumably of wood, with just two low steps, now stone built, leading down from the court.

Regardless of whether or not the function of the room remained the same, the form was significantly altered; so having invested materials and labour in service of a particular design, they realized that either they did not need a room for that purpose or that the design was simply not suitable. Unlike sequential floors or bracing walls that merely extend the life of or renew a given space, this was a fundamental remodelling.

Other deposits of waterborne debris in the sunken rooms (4–8) at the south of the court likewise suggest that one of the major design flaws of this building was the court itself; perhaps unused to such a large open space in the centre of the building they were unprepared for just how much water might be diverted into these sunken rooms. The level of the court along with Rooms 1–3 and 10–11 had been raised with the addition of 40–50 cm of fill, a substantial undertaking, so the final height of the surface was itself a choice, in this case a choice that occasioned problems with flooding and drainage in the lower rooms and street outside.

Room 3, at the south side of the court, was reached via a polythyron, or pier and door partition, from the paved stoa bordering the court (Fig. 3.6).

These polythyra, which I will address again further on, are a typical elite architectural feature of Minoan building, creating a permeable boundary of pillars with narrow double doorways between. As demonstrated by Palyvou (2005: 144) with preserved examples from Akrotiri on Thera, these are essentially wooden support systems, though on Crete only the stone jamb bases remain. In Room 3 there were five jamb bases, two gamma-shaped at either end and three tau-shaped in the centre, providing four doorways of 70 cm at either end and 80 cm in the middle (Fig. 3.7).



(a)

(b)

Fig. 3.5. (a) Room 8 (plan by author and J. Driessen; reproduced with permission of the British School at Athens); (b) detail of clay steps (photograph by L. H. Sackett; reproduced with permission of the British School at Athens).

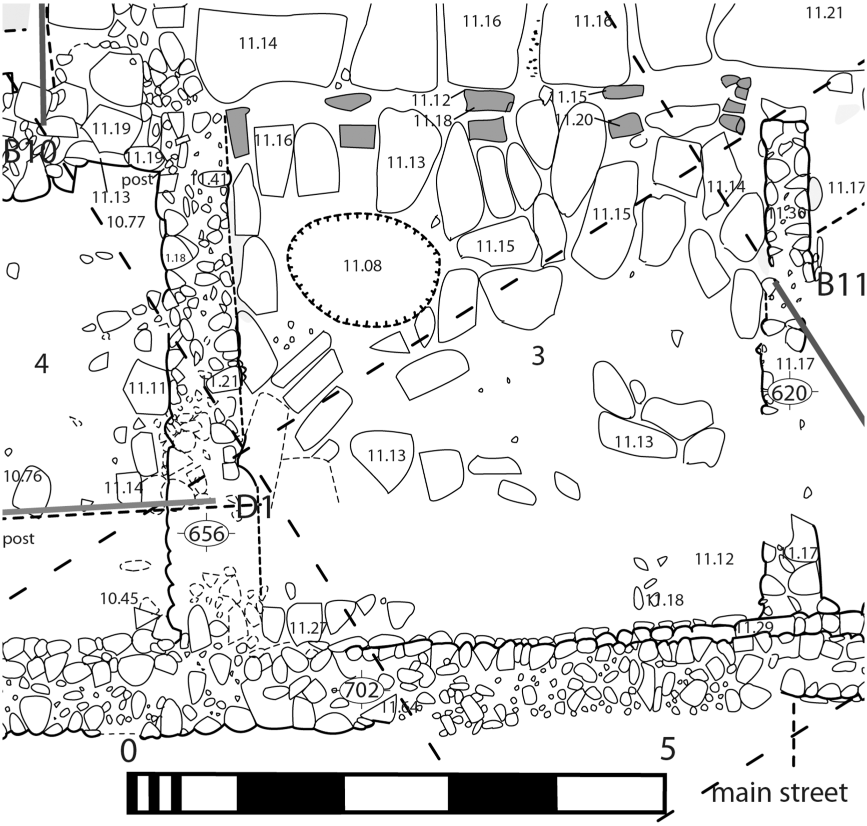


Fig. 3.6. Room 3 (plan by author and J. Driessen; reproduced with permission of the British School at Athens).

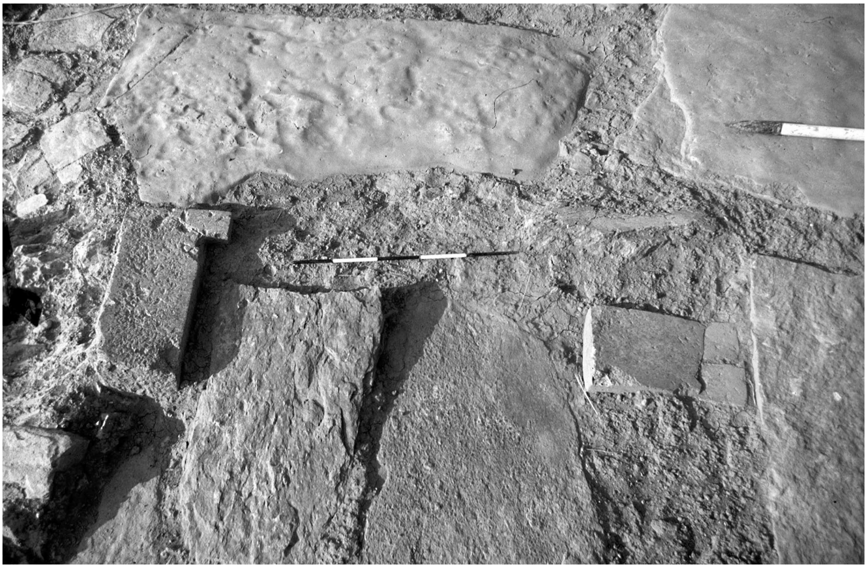


Fig. 3.7. Jamb bases (photograph by L. H. Sackett; reproduced with permission of the British School at Athens).

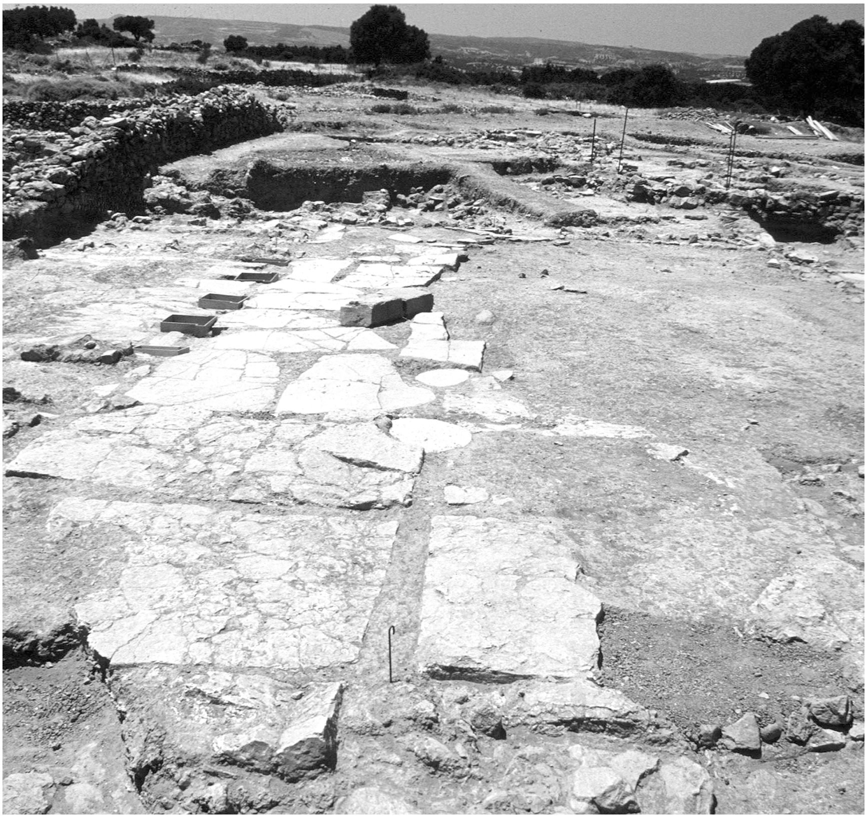


Fig. 3.8. Platform (photograph by J. Driessen; reproduced with permission of the British School at Athens).

Dating to either MM IIB or early IIIA, these are some of the earliest examples of this typically Minoan system yet known, and all were made out of a fairly soft stone[3] normally reserved for vases—aside from the single example of a column base from Malia, these jamb bases (and one fallen into Room 7 of the same building) are the only known occurrence of this stone for construction purposes. They are also the only ones where the tau-shaped bases are made up of two separate pieces, possibly the result of breakage during fabrication or simply a mistake in design. Though attractive, this was not the right kind of stone to use for such pieces. Similarly, the white stone used for the large slab paving at the east end of the court seems to have been a poor choice, from a practical standpoint, as it was also excessively friable (Fig. 3.8). Set on a bedding of carefully sifted sand and gravel inside a painted and plastered wooden frame this was rather a lot of effort to produce an extremely fragile floor surface and a clear case of aesthetics trumping engineering.

Another aspect of Minoan building that is well known but rarely explored is the extensive use of plastered rubble. Especially in the MM I–II periods, but frequently thereafter as well, most walls—even in the palaces—were made of plastered rubble, with ashlar corners, terminal points, and orthostates (Shaw 2015: 82–3; for rubble piers 102–3, Fig. 4.10). The cut stone portions of such wall constructions are not necessarily structural; in fact they rarely carried on to the full height of the wall and their locations are perhaps better understood as the most visible (or touchable) spots; the parts of walls which are the most likely to come under scrutiny. This is even clearer when we realize that in most buildings the stones used, sandstone or gypsum, are not particularly durable. But if the 'real' stones are being used where they can be seen or touched, and the plastered rubble is often decorated to imitate cut stone, as we see in the iconography,[4] then we must accept an element here of masquerade—as cut stone blocks were significant, and used to impress, but were also being faked.

Indeed, Minoan building could be deceptive. Walls of rubble with wooden support skeletons were presented as solid stone; stone itself was often decorative even when seeming structural, and painted plaster imitated fine marble. An interesting find from the South-east Building of Block M appeared to be an *in situ* fragment of a plastered column on a finely carved stone base (Knappett and Cunningham 2012: 29, pl. 9d). Expecting that the plaster had preserved the carbonized remains of the wooden column, it was carefully lifted as one piece, only to find during study that it was simply rubble—stones and clay—with no wood or charcoal at all (Fig. 3.9). As it sat directly on the stone base, and as the curve of the plaster matched the curve of the base, and it was preserved some 6–8 cm high, and nearly half the diameter of the column, there is really no other explanation than that this was a non load-bearing feature—either a rubble column, or a rubble base—neither of which would support any weight at all, or possibly rubble surrounding a much smaller structural support such as a beam about 10 cm in diameter, surrounded by rubble (on a base 46 cm in diameter). There were other examples of plastered, shaped rubble (Knappett and Cunningham 2012: 20) fallen into Room 7, one possibly in imitation of a wooden beam.

We are accustomed to the inverted columns of Minoan architecture, and of course many were for certain real (at Knossos the charred remains were found), but they may well have been valued highly enough for symbolic reasons so as to be imitated as non-structural elements, i.e. for looks alone. Certainly the alternating pillar and column stoas, such as at Malia (Shaw 2015: 116–17) are as decorative as they are functional, and not every member need have been load-bearing. The ornamental is therefore disguised, or at least presented, as the structural.

But is this just an understandable failure of an overreaching provincial elite? Is it just that Palaikastro lacked the skilled and experienced technicians of the

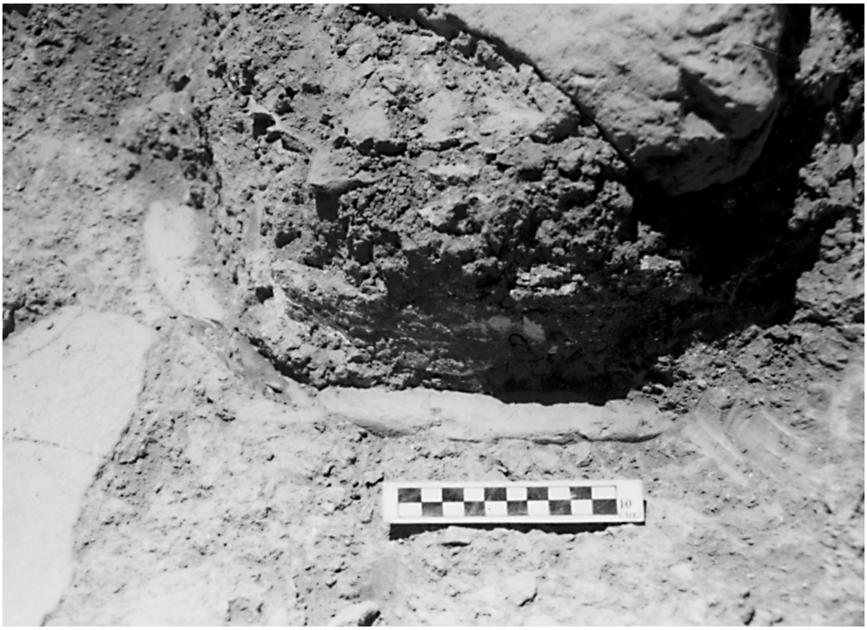


Fig. 3.9. *In situ* column remains (photograph by L. H. Sackett; courtesy The British School at Athens).

central polities? Before moving on to town planning, I would like to briefly reconsider the polythyra and Minoan Hall system (Letesson 2013). These boundaries made up of numerous wooden door leaves have been heralded as a brilliant design, ideal for distributing light and air, with adjustable permeability, but I think it is worth considering just how difficult they may have been in practice. Systems such as in the Little Palace at Knossos or the Domestic Quarter in the Knossos Palace had respectively as many as twenty-eight or even thirty-six individual wooden door leaves that would need to be secured, whether open or closed, and which would almost certainly have been a nuisance even if Crete was somehow less windy during the Bronze Age. They may well have been impressive on first glimpse, or in plans or models, but perhaps it is no accident that these systems were neither renewed[5] nor ever reinvented.

3.4. TOWNS

Assessments of the presence or degree of town planning in ancient societies are perhaps even more variable than debates over polite vs vernacular architecture, particularly where Minoan Crete is concerned (Branigan 2001: 38;

Buell 2014: 257–8, with references; see also chapter 15). Buell's own criteria revolve around the relationship between town (or city) and hinterland and, borrowing from Smith (2007, 2008), a fairly simple set of conditions, starting with coordination: that a building be put in a specific place with regard to pre-existing structures. A low bar, to be sure, and it is hard to imagine any significant settlement that would fail to qualify as planned, but perhaps that is the point—to recognize just how pervasive the need for planning is. True or not, it is not the sort of planning that interests me here.

Was the Minoan built environment, its habitations, buildings, open spaces, road systems, settlements, and regions being created or shaped according to ideological or formal aesthetic rules derived from abstract concepts? How many of the necessary decisions being made during these construction episodes could have been made on the basis of purely local inputs and constraints? Is the scalar unit, be it building, neighbourhood, settlement, region, or state itself being created, apprehended, or manipulated in the abstract prior to its materialization and, if so, is it according to some criterion? As often noted (including above), Minoan architectural details in plans, structural systems, and ornament proliferated across Crete and beyond but there are many possible mechanisms for their transmission and adoption including emulation/imitation (e.g. Wiener's Versailles effect); can we be sure such standardization goes beyond mere fashion?

Although average house sizes vary from site to site, within each site there is consistency (Cunningham 2007: 107; Whitelaw 2001: 17) and often evidence for site-wide construction episodes that worked on the street system and houses at the same time (Knappett and Cunningham 2012: 82–3; see also chapter 9). Streets themselves create the distinction between public and private space, but street construction obliterates that very distinction. That is to say, building or fashioning streets requires one to identify the intersection of different kinds of space, and different claims to property. Whatever they might be there is always a decision to be made about where a street will go, even if it is just following an earlier route, or what boundaries to respect, even if they have always been respected.

Indeed, the street systems are perhaps the most obvious examples of planning at a supra-domestic scale where at least portions of the town are conceived as entities in themselves. The provision of adequate drainage demanded this, as did the need to facilitate movement of people and goods into, through, and out of the towns. Drainage is a practical consideration, and an appropriate degree of planning to ensure a smoothly functioning system is really planning in the most basic sense. On the other hand, providing for (and controlling) movement can go well beyond mere pragmatic concerns, and takes the concept of planning to a different level—one where forms can be chosen for non-utilitarian, even ornamental purposes, and the ornament itself, through signification, can affect or control circulation.

The layout of the street grid at Palaikastro is notably linear and axial (Fig. 3.10) and certainly seems to be designed to facilitate the movement of goods and people through the settlement (Cunningham 2001: 80). It also seems to have been imposed on the town in MM IIB–IIIA during the same construction episode (and presumably using the same crews) as the construction of Block M and probably much of the rest of the town. In at least one instance, Main Street ran over and most likely required at least the partial demolition of an earlier building in Block X, and once built it was maintained for centuries, taking precedence over the buildings on it (Cunningham 2007: 102).

It would be easy to assume that there was a practical purpose to such a wide, straight roadway, but if we look at the pavements used in each of its four major phases we see that initially the paving was in green schist (MM IIB–IIIA); then sandstone (MM IIIB–LM IA); then purple schist (LM IB) and finally sandstone again (LM III) (MacGillivray et al. 1998: 263, fig. 20). None of these stones are remotely suitable for any kind of heavy use; foot traffic would quickly erode the

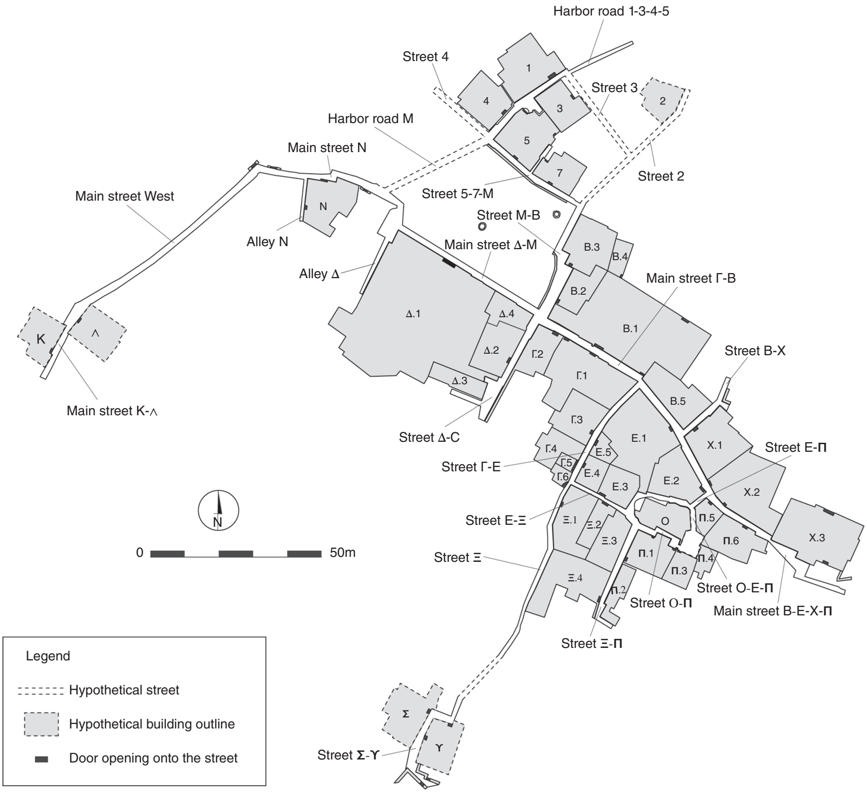


Fig. 3.10. Street grid (plan by Q. Letesson, J. Driessen, and H. Comyn, reproduced with the permission of the British School at Athens).

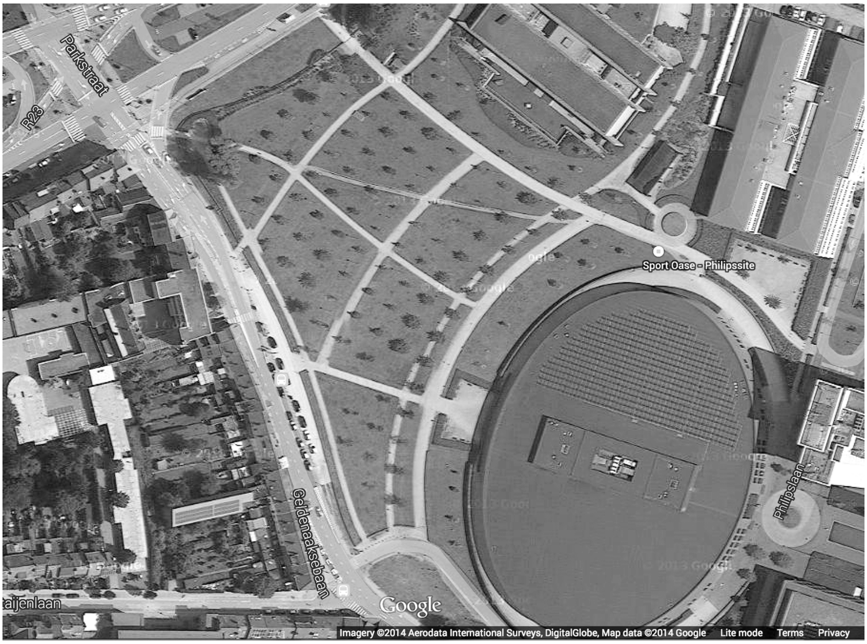
sandstone and the schist would barely survive the elements and require regular if not constant upkeep. So beyond the simple need for a roadway of some kind, Main Street seems to have been designed according to aesthetic and/or symbolic guidelines and for essentially ceremonial purposes;[6] furthermore, the form it took gives the *impression* of functionality while serving a *primarily* ceremonial or symbolic role. This echoes the architectural habit of disguising the *ornamental* elements as *structural.*

Most of the streets and routes known from Minoan Crete are arguably unplanned; they meander, follow contours, seem created by the buildings on them, and vary in width and construction. But some examples, such as Palaikastro Main Street or the interconnected street system at Gournia (see chapter 9) were certainly planned, and at the palatial centres, Knossos, Malia, and Phaistos, there are clear attempts at generating and directing circulation in explicitly coercive ways. All three of the major palaces have distinct west courts with raised forking paths right at the intersection of town and palace.

These raised walkways have long been accepted as primarily ceremonial (Shaw 2015: 14; Driessen 2009: 47, 51; see also chapter 15), and whether or not people were expected or required at certain times to use these paths the very contrast between them and the standard routes available suggests that they would be at least as notable for the Minoans. Such walkways are unlikely to have facilitated movement; under ordinary circumstances (assuming regular casual foot traffic was even allowed in the area) they would either be ignored or have required at least implied coercion to keep people on them. Such formalization of pathways is rarely successful (Fig. 3.11) and as Hillier (2007: 155) writes: 'badly designed space can create a pathology in the ways in which space is used'.

The interface between town and palace as mediated by these raised paths ends at the back wall of the main storerooms which, in each case, was probably the most monumentalized aspect of each structure. Approaching from town, one confronts a huge wall with massive orthostates at human level and rubble, perhaps disguised to look like solid stones, above. At this point one is also confronted with an extreme kind of crowd control as even if the paths were only used or required on certain occasions, they were always there.

The combination of monumental architecture and restricted or controlled movement calls attention to what lies behind the wall—storerooms that are themselves of course invisible. Even those granted access might not be able to see what was inside the massive pithoi, so the actual content, the reality behind the outward presentation of monumental, protected storage, remained unknown. There is no reason to assume that the storerooms were understocked, of course, but it is worth noting that here at this focal point where the town confronts the palace is what appears to be a structural foundation of the polity (surplus) that could in fact have been merely or mostly ornamental. In any case, this kind of sudden interruption of normal access, and the way the


Parkstraat
R23
Sport Oase - Philipssite
Geldenaaksebaan
Philipslaan
aijenlaan
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Imagery ©2014 Aerodata International Surveys, DigitalGlobe, Map data ©2014 Google Lite mode Terms Privacy

Fig. 3.11. Google Maps image of Sportoase Leuven; note original, orthagonal planned pathways bisected by the traffic-created narrow dirt track.

palaces themselves tend to actually block movement through the towns, was not necessarily a comfortable way of organizing movement.[7]

Another aspect of town planning is the segregation of neighbourhoods according to use or class. The evidence for such segregation or the lack thereof in Minoan towns is insufficient (Branigan 2001: 45; Whitelaw 2001: 22), though on balance it seems that 'larger-scale economic zonation . . . would appear not to be a strong structural component of Minoan urbanism' (Whitelaw 2001: 24).

Just as economic concerns do not seem to have played a large role in determining the form of the Minoan town, there is no sign that military requirements had any significant impact on the organization of settlements (Branigan 2001: 43); and demographically, Branigan (2001: 48) suggests that as much as 60 per cent of the population was urban and that many if not all inhabitants of the town would have needed to be involved in agriculture, the implication being that there was no determinative functional or pragmatic demographic advantage to, or reason for, the urbanization of Minoan Crete.

Buell's study of the Galatas region (2015) powerfully underscores this point, as what can only be called a typical Minoan town, with a palatial core and more dispersed hinterland, was created *ex nihilo* in a region that had no precursor whatsoever. As with the transformation at Palaikastro (and at roughly the same moment) this urbanization was effected, not for economic or military advantage, nor merely as the organic outgrowth of some localized process, but as a conscious transformation of the material form of society.

3.5. CONCLUSIONS

We have tended to take Minoan architecture and urbanism at face value and in doing so have perhaps too easily accepted it on its own terms, seeing the ornamental as structural and vice versa. If on a symbolic level Minoan architecture worked as a kind of projection, almost propagandistic, of its values and goals, then perhaps we should consider why. In order to do so, a degree of irreverence might actually help. I do not mean to suggest that we totally discard or reverse our appreciation for the presence of genius, at a societal level at least, in Minoan Crete, just that we take a moment to consider it with a more judgemental eye.

The Minoans made mistakes: mistakes in plan and failures in execution. Many of these, whether bad design or poor choice of materials, came about while implementing some form of shared elite culture, often in service of ornament, at times with an element of deception. Ornamental choices resulted in technical mistakes, especially where elite building was concerned.

Whether in buildings, as at Palaikastro, or in town planning, the proliferation of 'palatial' features and spatial organization was correlated with obvious problems. Most of the Neopalatial architectural koine (Driessen 1989–90; Letesson 2009; 2014: 55–6) wound up being undone. Lustral basins were filled in (McEnroe 2010: 100), polythyra and Minoan halls were remodelled, the jamb bases by times used for totally different purposes, such as drain covers (Shaw 2015: 104, citing Macdonald 1988); buildings in the new style such as the South-east Building were abandoned (Knappett and Cunningham 2012: 321) and, tellingly, an entirely new palatial town, Galatas, argued by Buell (2015) to be purpose-built almost from scratch, lost its palatial character and much of its population.

The nature of these Neopalatial features could be discussed at length, as by Letesson (2014) using the concepts of invention and innovation. He stresses the spatial or structural properties of innovative architecture, noting that the configurative properties of the buildings change from agglutinative to articulated (2014: 56). In at least some cases the mechanism for this change in spatial properties is the incorporation of either large open courts (as in the palaces) or communal hosting/feasting spaces (as in the houses). These are social choices that carry with them spatial consequences; but if we consider the symbolic signification of these newly introduced spaces as equally if not more important than their function, in other words as a kind of ornamentation, then we can see them also as formal choices that carry social consequences. Considering the variability in how these courts and halls were spatially incorporated into the buildings (Letesson 2013: 319), it may well be that their formal characteristics were more essential than their spatial roles.

The South-east Building is a good illustration of this. There is a clear formal resemblance to elite Neopalatial architecture, with a central court, stoa, and reception room with polythyra but without the Neopalatial genotypic innovation postulated by Letesson—it has in form a classically 'agglutinative' aspect. One could argue that it is an early example, but even so, what is striking is that it was the formal aspects of the building and not the spatial/structural ones that were copied first.

Is it possible that the importance of the formal aspects of Minoan architecture and urbanism, what were essentially aesthetic choices, were more important than the functional or spatial ones?

Letesson (2013: 319) also found a wide variation in the way Minoan Hall systems functioned spatially, a variation that he interpreted as reflecting a chronological shift in needs. As noted above, this also might suggest that the spatial arrangement or function, the ways these hall systems distribute integration, is therefore not the essential component, chronology notwithstanding. In other words, either the category (Minoan Hall systems) is false (and in this case it certainly isn't) or that criterion, of spatial configuration, is not the essential part of its identity. So while it may have been essential for a certain class of buildings to have rooms that were *formally* recognizable as Minoan Halls, they would be used differently, spatially speaking, in the different buildings, as the decorative elements and what they signified were more important than the spatial characteristics.

It seems that the functional aspects of Minoan architecture were perhaps not as important as the symbolic, and that there is an element of disguise or even obfuscation as well, all of which seems especially concentrated in what we could broadly consider official or elite architecture. Were these elite, official architectural forms merely the result of a quest for luxury and comfort? If the ornamental could be presented as structural, architecturally speaking, is it possible that socially speaking the structural was presented as ornamental? That the ceremonial, festive, ritual aspects of Minoan life, as represented by the iconography, were in fact the mechanisms of control?

There is always an underlying current of resistance to structured social organization, though it is often overlooked. Certainly Crete has never been easily united. Overcoming this, attracting and holding a population, would require more than simple force—or the threat of force—as there were options in Crete readily available for anyone who felt the burdens of civilization growing too strong. Minoan culture has often been seen to present a kind of worldly sophistication, an urbanity, and a kind of egalitarianism rather than anything explicitly coercive or restrictive. Some of this may be modern projection (Bintliff 1984) but some seems to have been projected by the Minoans themselves. The MM IIB–IIIA transformation of Crete does not seem to have been coercively enforced nor hierarchically organized, but was pervasive nonetheless; the mechanism or system by which this was done was probably idiosyncratic, perhaps not unique but different from neighbouring cultures. Typical coercive measures, such as force (as used generally in Egypt where the Nile provided a strong geographic constraint) or control of surplus food supply (as in Mesopotamia, where it was required to cope with floods and the need for large scale irrigation provided rewards for social organization) were not enough in a place like Crete, where there were always available options to settlement in the coastal urban centres. The population needed to be coaxed and controlled in a very different way.

In order to effect the necessary degree of control, elites needed traction; defined as the penetration of everyday life by cultural icons and trappings, or as Feinman and colleagues (2000: 453) describe 'social segments woven together through broad integrative ritual and ideological means'—as can be readily seen in, for example, the Harvester vase and various group scenes from the frescos (Cunningham 2007: 106).

In Crete there was no standing tradition of megalithic monument building; for territorial markers we have (maybe) peak sanctuaries, and the archival remains, at least prior to the Late Minoan II–III Linear B material, are nothing like the dense bureaucratic infrastructure such as there was in Egypt and Mesopotamia from at least the Early Bronze Age on. We should not pretend that lack of texts and the difficulties they present in decipherment (multiple scripts/languages, inconsistent use) are only an accident of preservation, as these were also characteristics of the culture.

Looking for mechanisms of control we find instead what have been called cognitive codes (Driessen 2002: 11–12; citing Blanton 1998: 144–5) or, more generally, mutual knowledge: shared cultural tropes that allowed the structured dissemination of encoded myths or stories. Elite material culture worked as badges or symbols to identify and demonstrate membership in the network of privileged members of society.

Of course elites also needed to provide tangible benefits, generally calories. It seems that one of the uses of the halls and courts was for commensality. Along with the introduction of such spaces, we see the development and proliferation of the small handleless cups. This begins in earnest at Palaikastro with plain tumblers in MM IIA. These plain tumblers shortly become the ubiquitous conical cups and ledge rim bowls; and these are signs of traction, of contact points with the populace, but they are relentlessly plain—so while the people themselves are treated as a unity and contained by an ornamented space, the object of the feast, the food or drink taken by each individual, was delivered and consumed in the plain forms, perhaps to foster the sense of egalitarianism and communal unity required for social bonding. The impression of plainness and egalitarianism that these conical cups provide, and the tremendous numbers in which they are found, display a similar tension between controlling and offering, coercing and enticing, such as we see in the tension between ornament and structure in the architecture. These tensions informed and ultimately supported the balancing act that was Minoan Civilization.

NOTES

1. 1902–3 (Bosanquet et al. 1901–2, 1902–3, 1903–4, 1904–5, 1905–6; Bosanquet and Dawkins 1923; Hutchinson 1939–40); 1962–3 (Sackett et al. 1965, 1970); 1986–2003 (preliminary reports: MacGillivray et al. 1987, 1988, 1989, 1991, 1992, 1998; final publications: MacGillivray et al. 2000, 2007; Knappett and Cunningham 2012); and 2013–15.
2. This is especially true where mudbrick is concerned. The term has often been used to describe a particular mixture of soils and organic matter, typical of the *material* used to make mudbricks, regardless of whether there was any sign of shaping, mould marks, etc. There are some indications that real moulded mudbricks were not used prior to LM I at Palaikastro. See also Devolder 2005–6.
3. Metabasite known locally as ‘οφιτηV’ and commonly (though perhaps incorrectly) as serpentinite.
4. The *Town Mosaic* (Evans 1921: 301–14) appears to depict isodomic ashlar masonry, something virtually unknown from Crete (Shaw 2009: 66), where even coursed ashlar walls are usually of varying heights and irregular stonework, so either it was fantasy or the walls were plastered and decorated in imitation of coursed stonework.
5. Polythyra were almost universally adapted back into regular walls with regular door openings when the spaces were reused.
6. At the west, Main Street narrows, curves and may have had stairs, while to the east it seemed again to curve and lead to steps, so its width and linearity were not to facilitate any sort of wheeled traffic, nor necessarily (*contra* Cunningham 2001) serving primarily global integration; rather, while it seems to have served a larger than normal amount of people it served more to hold them in than to pass them through the space.
7. Similarly, the central courts, which seem to have predated the palaces as social venues of great significance (Shaw 2015: 21; Driessen 2007: 78; Tomkins 2012: 42–3; Todaro 2009) are enclosed, starting slowly perhaps as early as EM III, but certainly by MM IIB and increasingly thereafter. This might seem like an effective way to consolidate or manufacture political power, but it is also likely to be socially divisive, at least on a spatial level.

REFERENCES

Alexander, C. 1979. *The Timeless Way of Building*. Oxford: Oxford University Press.

Alexander, C., S. Ishikawa, M. Silverstein, M. Jacobson, I. Fiksdhal-King, and S. Angel. 1977. *A Pattern Language: Towns, Buildings, Construction*. Oxford: Oxford University Press.

Bintliff, J. 1984. 'Structuralism and Myth in Minoan Studies'. *Antiquity* 88: 33–8.

Blanton, R. 'Beyond Centralization: Steps Toward a Theory of Egalitarian Behavior in Archaic States'. In *Archaic States*, edited by G. Feinman and J. Marcus. Santa Fe, NM: School of American Research Press: 135–72.

Bosanquet, R. C. 1901–2. 'Excavations at Palaikastro. I'. *Annual of the British School at Athens* 8: 286–316.

Bosanquet, R. C. and R. M. Dawkins. 1923. *The Unpublished Objects from the Palaikastro Excavations 1902–1906* (BSA Supplementary Paper I). London: British School at Athens.

Bosanquet, R. C., R. M. Dawkins, M. N. Tod, W. L. H. Duckworth, and J. L. Myres. 1902–3. 'Excavations at Palaikastro. II'. *Annual of the British School at Athens* 9: 274–387.

Branigan, K. 2001. 'Aspects of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 38–50.

Buell, D. M. 2014. 'Districts, Neighbourhoods, and the Streets that Bind Them: Urban Planning in Minoan Cities'. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond: Proceedings of a Colloquium in Memory of Frederick E. Winter, Athens, 22–23, June 2012*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 55–82.

Buell, D. M. 2015. 'The Rise of a Minoan City and the (Re)Structuring of Its Hinterlands: A View from Galatas'. In A. Creekmore III and K. Fisher (eds). 2015. *Making Ancient Cities: Space and Place in Early Urban Societies*. Cambridge: Cambridge University Press: 257–91.

Cunningham, T. 2001. 'Variations on a Theme: Divergence in Settlement Patterns and Spatial Organization in the Far East of Crete during the Proto- and Neopalatial Periods'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 72–86.

Cunningham, T. 2007. 'In the Shadows of Kastri: An Examination of Domestic and Civic Space at Palaikastro (Crete)'. In *Building Communities: House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fischer, and J. Whitley. London: British School at Athens: 99–109.

Dawkins, R. M. 1905–6. 'Excavations at Palaikastro. V'. *Annual of the British School at Athens* 12: 1–8.

Dawkins, R. M. and C. T. Currelly. 1903–4. 'Excavations at Palaikastro. III'. *Annual of the British School at Athens* 10: 192–231.

Dawkins, R. M., C. H. Hawes, and R. C. Bosanquet. 1904–5. 'Excavations at Palaikastro. IV'. *Annual of the British School at Athens* 11: 258–308.

Devolder, M. 2005–6. 'From the Ground Up: Earth in Minoan Construction. The Case of Building 5 at Palaikastro'. *Aegean Archaeology* 8: 65–80.

Driessen, J. 1989–90. 'The Proliferation of Minoan Palatial Architectural Style (I) Crete'. *Acta Archaeologica Lovaniensia* 28–9: 3–23.

Driessen, J. 1999. 'The Dismantling of a Minoan Hall at Palaikastro (Knossians go Home?)'. In *Meletemata: Studies in Aegean Archaeology Presented to Malcom H. Wiener as He Enters His 65th Year* (Aegaeum 24), edited by P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier. Liège: Université de Liège: 227–36.

Driessen, J. 2002. '"The King Must Die": Some Observations on the Use of Minoan Court Compounds'. In *Monuments of Minos: Rethinking the Minoan Palaces. Proceedings of an International Workshop held in Louvain-la-Neuve, 2001* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 1–15.

Driessen, J. 2007. 'IIB or not IIB: On the Beginnings of Minoan Monument Building'. In *Power and Architecture: Monumental Public Architecture in the Bronze Age Near East and Aegean* (Orientalia Lovaniensia Analecta 156), edited by J. Bretschneider, J. Driessen, and K. Van Lerberghe. Leuven: Peeters: 73–92.

Driessen, J. 2009. 'Daidalos' Designs and Ariadne's Threads: Minoan Towns as Places of Interaction'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 41–54.

Evans, A. 1921. *The Palace of Minos at Knossos,* Vol I: *The Neolithic and Early and Middle Minoan Ages*. London: Macmillan.

Farnoux, A. 1993. *Cnossos: L'archéologie d'un rêve*. Paris: Gallimard.

Feinman, G. M., K. G. Lightfoot, and S. Upham. 2000. 'Political Hierarchies and Organizational Strategies in the Puebloan Southwest'. *American Antiquity* 65.3: 449–70.

Graham, J. W. 1962. *Palaces of Crete*. Princeton, NJ: Princeton University Press.

Hillier, B. 2007. *Space is the Machine: A Configurational Theory of Architecture*. Electronic edition. London: Space Syntax.

Hillier, B. and J. Hanson. 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.

Hitchcock. L. 2000. *Minoan Architecture: A Contextual Analysis*. Jönsered: Paul Aströms Förlag.

Hutchinson, R. W., E. Eccles, and S. Benton. 1939–40. 'Unpublished Objects from Palaikastro and Praisos. II'. *Annual of the British School at Athens* 40: 38–59.

Jacobs, J. 1961. *The Death and Life of Great American Cities*. New York: Random House.

Knappett, C. and T. Cunningham. 2012. *Palaikastro Block M: The Proto- and Neopalatial Town*. London: British School at Athens.

Letesson, Q. 2009. *Du phénotype au génotype: analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2013. 'Minoan Halls: A Syntactical Genealogy'. *American Journal of Archaeology* 117.3: 303–51.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches* *to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Macdonald, C. F. and J. M. Driessen. 1988. 'The Drainage System of the Domestic Quarter in the Palace at Knossos'. *Annual of the British School at Athens* 83: 235–58.

MacGillivray, J., J. M. Driessen, and L.H. Sackett. 2000. *The Palaikastro Kouros: A Minoan Chryselephantine Statuette and its Aegean Bronze Age Context*. London: British School at Athens.

MacGillivray, J., L. H. Sackett, J. M. Driessen, A. Farnoux, and D. Smyth. 1991. 'Excavations at Palaikastro, 1990'. *Annual of the British School at Athens* 86: 121–47.

MacGillivray, J., L. H. Sackett, J. M. Driessen, and S. Hemingway. 1992. 'Excavations at Palaikastro, 1991'. *Annual of the British School at Athens* 87: 121–52.

MacGillivray, J., L. H. Sackett, J. M. Driessen, C. MacDonald, and D. Smyth. 1988. 'Excavations at Palaikastro, 1988'. *Annual of the British School at Athens* 83: 259–82.

MacGillivray, J., L. H. Sackett, J. M. Driessen, and D. Smyth. 1987. 'Excavations at Palaikastro, 1986'. *Annual of the British School at Athens* 82: 135–54.

MacGillivray, J., L. H. Sackett, J. M. Driessen, E. Hatzaki, and I. Schoep. 1998. 'Excavations at Palaikastro, 1994 and 1996'. *Annual of the British School at Athens* 93: 221–68.

MacGillivray, J., L. H. Sackett, and J. Driessen. 2007. *Palaikastro: Two Late Minoan Wells*. London: British School at Athens.

MacGillivray, J., A. Sarpaki, J.-P. Olivier, J. Weingarten, L. H. Sackett, J. Driessen, R. Bridges, and D. Smyth. 1989. 'Excavations at Palaikastro, 1988'. *Annual of the British School at Athens* 84: 417–45.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Palyvou, C. 2005. *Akrotiri, Thera: An Architecture of Affluence 3,500 Years Old*. Philadelphia, PA: INSTAP Academic Press.

Preziosi, D. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: Mouton.

Sackett, L. H. and R. M. Popham. 1970. 'Excavations at Palaikastro VII'. *Annual of the British School at Athens* 65: 203–42.

Sackett, L. H., R. M. Popham, P. M. Warren, and L. Engstrand. 1965. 'Excavations at Palaikastro VI'. *Annual of the British School at Athens* 60: 249–315.

Schoep, I. 2010. 'The Minoan "Palace-Temple" Reconsidered: A Critical Assessment of the Spatial Concentration of Political, Religious and Economic Power in Bronze Age Crete'. *Journal of Mediterranean Archaeology* 23.2: 219–43.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. 2nd edn. Padua: Aldo Ausilio.

Shaw, J. W. 2015. *Elite Minoan Architecture: Its Development at Knossos, Phaistos, and Malia*. Philadelphia, PA: INSTAP Academic Press.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6.1: 3–47.

Smith, M. E. 2008. *Aztec City-State Capitals*. Gainesville, FL: University Press of Florida.

Todaro, S. 2009. 'The Latest Prepalatial Period and the Foundation of the First Palace at Phaistos: A Stratigraphic and Chronological Re-assessment'. *Creta Antica* 10.1: 105–45.

Tomkins, P. 2012. ‘Behind the Horizon: Reconsidering the Genesis and Function of the “First Palace” at Knossos (Final Neolithic IV–Middle Minoan IB)’. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 32–80.

Whitelaw, T. 2001. ‘From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism’. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

4

Architectural Energetics and Late Bronze Age Cretan Architecture

Measuring the Scale of Minoan Building Projects

Maud Devolder

It may appear to be asking too much of archaeological evidence to attempt an assessment of the scale of Minoan building projects, their impact on communities, or the role of the labour-time needed for the construction of various kinds of masonry. By taking a firmly materialist perspective, however, the present paper offers an exploration of some of the parameters at play in the production of Minoan architecture.

4.1. ARCHITECTURAL ENERGETICS

Architectural energetics is a method that translates a building into the labour-time necessary for its construction, a value expressed in person-days or person-hours (abbreviated p-d and p-h). Estimations are based on standard units of time necessary to accomplish each task making up the architectural project: the procurement of raw materials, their transport, manufacture, and assembling. These are most generally expressed in volumes per hour per person, and referred to as 'standard costs', which are applied to the volumes of edifices and thus determine the labour-time necessary for their construction.

The first assessments of the duration and manpower of ancient building projects mainly appeared in the form of subjective labour-time estimates triggered by romantic views of the grandeur of early civilizations (Andrews 1877; Humboldt 1816; Squier and Davis 1848; Stephens 1841; Webster 1997: 219). Around the middle of the twentieth century, a growing body of publications started to make use of such estimates in order to correlate the magnitude of building or agricultural projects with particular stages of socio-political organization (Adams 1975; Cook 1947; Cottrell 1955; Erasmus 1965; Heizer 1960, 1966; Kaplan 1963; White 1949, 1959). Among the most prominent figures of this early trend was C. J. Erasmus, who led a series of experiments that aimed to provide objective quantification of building costs (Erasmus 1965). From the 1970s onwards, largely connected with a renewed research agenda promoting scientific methods of data recovery and interpretation of the archaeological record, quantitative assessments of architectural projects flourished (Aaberg and Bonsignore 1975; Arnold and Ford 1980; Carmean 1991; Cheek 1986; Craig, Holmlund, and Clark 1998; Hard et al. 1999; Price 1982; Trigger 1990; Webster 1985; Webster and Kirker 1995). Diverse applications were proposed, exploring the relationship between energy and social complexity, among which E. Abrams offered the most systematic application of architectural energetics to a building project (Abrams 1984a, 1984b, 1987, 1989, 1994, 1995; Abrams and Bolland 1999; for an agricultural programme, see Arco and Abrams 2006). By objectively assessing the labour-time invested in Mayan architecture, he measured the extent of labour control exerted by the different members of the population, and their capacity to organize it. As was the case with earlier approaches, Abrams examined the relationship between architecture and socio-political development, but he challenged the direct correlation between the two as he wished to envision the broader cultural context in which ‘a compromise between various needs and costs’ took place (Abrams 1989: 50–1). It is now thirty years since he coined the term ‘architectural energetics’ (Abrams 1984a), and his applications have been extensively emulated by archaeologists working in diverse fields, both chronologically and geographically (for the broad Mediterranean, see for example Brysbaert 2013, 2015a, 2015b; DeLaine 1997; Devolder 2005, 2009, 2012, 2013, and 2015; Fitzsimons 2014; Homsher 2012; McEnroe 2010; Ristvet 2007; Webster 1991; Wright 1987).

An alignment towards architectural energetics largely reflects the affinities and background of the scholars in question. Criticisms generally revolve around two major aspects: the unquantifiable premises which have an impact on the standard costs, and the generally subjective interpretation of the results, however objective the calculations (Feinman 1996; Kowalski 1995; Pyburn 1996; Reynolds 2006; Webster 1997). Many factors impacting building activities are notably difficult to evaluate quantitatively. One could cite as examples the scarcity of building resources and priority of access to resources of certain groups over others (Pyburn 1996: 662), the physiological properties, diet, and psychological motivations of the builders (Reynolds 2006), or the climatic conditions under which the project is undertaken. These are indeed unquantifiable parameters, but they impact directly—although most often implicitly—on the evaluation of the time devoted to each task in the construction process. A most obvious illustration is the socio-political context within which the building project takes place: although architectural energetics aims to assess the pressure exerted by the ruling class over the rest of the population, the type of socio-political organization itself generates specific construction patterns and behaviours (e.g. the duration and intensity of the working day) (Erasmus 1965: 277). In other words, architectural energetics not only relies on standard costs established on seemingly unsteady ground but also runs the risk of circularity (Abrams 1989: 67). The inherent incompleteness of the archaeological record upon which the architectural restitutions are based also affects the application of standard costs to particular case-studies, since calculating the volumes of an ancient edifice cannot avoid inaccuracies. As far as the apparent dichotomy between objectively collected data and the subjective interpretation of the results is concerned, some authors stress that even though objectively assessed, the results can at best be consistent with pre-existing interpretations of the archaeological record, and fail to provide a confirmation of them (Rougié-Blanc 2014: 264; Stark 1984: 760; Webster 1997: 229; Kowalski 1995: 369). Architectural energetics seems at best weak or incomplete, at worst a pointless assessment of the built environment 'hidden under the objective cloak of calculations' (Dobres 2000: 41).

Despite these quite disheartening remarks, I claim that it is possible to provide accurate, well-informed labour-time requirements for ancient building projects. Following a materialist approach of the built environment, architectural energetics is based on sources which render the energy expended in construction projects in various modern cultural contexts. Variations with the Minoan reality are of course to be expected, but it is assumed that the physical characteristics of contemporary and Bronze Age individuals would not generate significantly different labour-time estimates for the same task providing it is performed under the same technical conditions. Reluctance to apply architectural energetics to archaeological remains not only ignores recent fieldwork on many sites (see chapters 2 and 9); by calling into question the ability to produce cautious but convincing restitutions of Minoan buildings it undermines the very purpose of archaeological research. At this point, we might remind ourselves that architectural energetics does not calculate the time actually spent erecting a building, but provides the best-informed estimate for it. The ensuing caution in reading the results of an energetic approach is indispensable if one is to integrate the fact that social, cultural, and archaeological constraints impacted on the labour-estimates of a building project. Such constraints are however not sufficient to discard a method that can address specific material aspects of the built environment. In the present application to the Minoan archaeological record, architectural energetics highlights the limited impact of building projects on the communities, and the linear distribution of the labour costs and diffusion of building practices suggests no severe control of building resources. Both aspects are so strongly supported by the labour-time estimates that even implicit parameters cannot have impacted significantly on the conclusions to be reached here. Also, although some of these conclusions echo suggestions made by other research on the Minoan built environment, it highlights particular social behaviours and choices of the builders towards material and technical constraints. It also allows for pertinent comparisons with architectural projects in other societies that illustrate some of the idiosyncrasies of Late Bronze Age Cretan architecture.

4.2. ARCHITECTURAL ENERGETICS AND LATE BRONZE AGE CRETAN ARCHITECTURE

4.2.1. Application of the Method to the Neopalatial Architectural Record

The application of architectural energetics to Late Bronze Age Minoan Crete relies on a detailed corpus of standard costs that best fit the materials and techniques of Neopalatial architecture (Devolder 2013: 11–47; Shaw 2009; Tsakanika-Theochari 2006). Such a corpus is based on sources which can be organized into three broad categories: the observation of labourers working with pre-mechanical techniques (sometimes in an experimental framework), specialized works intended for architects and engineers (based on project accounts or observations), and the reports of international institutions or local initiatives promoting architectural and/or agricultural projects in developing countries (Aaberg and Bonsignore 1975; Abrams 1987, 1994; DeLaine 1997; ECAFE 1957; Erasmus 1965; Fathy 1970; Klapisch-Zuber 1969; Kozelj 1988; Pegoretti 1843; Rea 1913; Startin 1978; Stocks 2001; Techniques rurales 1971; Wulff 1966). Publications dealing with the history of techniques are used to complement and refine the data (Cotterell and Kamminga 1990; Usher 1954). In order to adapt the standard costs to the Minoan archaeological record several decisions were taken, based on the material and technical characteristics of the buildings studied and on ethnographic data. For example, even though soil and field stones can be transported by chariot and sledge or pack-animal, human transport is favoured because ethnographic sources suggest that human carriers are more flexible than animals over short distances (DeLaine 1997: 107). Also, some formulas incorporate the density of the stone used, or the compactness or looseness of the soil excavated, as it may impact on the difficulty and hence labour-time of the task. Thus established, standard costs offer estimates for each building operation: the procurement of materials, their transport to the construction site, their manufacture, and their assembling into an edifice. Each one of them is considered for the materials and techniques most characteristic of Minoan architecture: rubble, mudbrick, ashlar (limestone, sandstone, or gypsum), megalithic and pseudo-isodomic masonry, ceiling and roofing, and levelling by digging and/or backfilling (Devolder 2013: tables 7–8).

These standard costs are applied to twenty-three Neopalatial buildings, ranging from simple houses to a palace, selected on the basis of the state of the ruin and the quality of documentation available.[1] The value of the application largely depends on the ability to provide for accurate restitutions and volumes to which the standard costs can be applied. In several cases, re-examination of long-excavated remains by various researchers has provided invaluable data that largely facilitated the calculation of the volumes (Fotou 1997; Mantzourani, Vavouranakis, and Kanellopoulos 2005; Mantzourani and Vavouranakis 2005; McEnroe 2001; Soles 1991). For each building the dimensions of each wall (preserved or extrapolated) are determined and its material and technical characteristics are assessed. The volumes are then calculated, after which the standard costs are applied. During this procedure, only the tasks necessary for the completion of the building shell are considered. Because data related to architectural decoration are strongly affected by the state of preservation of the edifice and might distort the results and comparisons between buildings, the labour-time connected to finishing is not estimated.

In order to adapt the standard costs to each case-study, various parameters are taken into account. Indeed, if they were to be applied uniformly to all the buildings in a sample, the approach would simply replicate a volumetric estimation of the remains. Such parameters include the location of the source of raw materials, the incorporation in the walls of materials generated by levelling works, the specific proportions of materials within the walls (e.g. mortar vs stone), the degree of manufacture of the stone, the loss of material in the process of manufacture, the roofing techniques (e.g. whether the roof is formed of superimposed layers of dirt or whether slabs are also incorporated), and the possible reuse of materials such as the integration of early remains into a new building project. In the case of ashlar, when the quarry is located along the shore, it is assumed that boats are used for at least part of the journey to the construction site. Because of uncertainties pertaining to ship transport (load capacity and speed), this labour-time estimate is excluded from the present research: only the time required for transporting the blocks from the unloading spot to the site is taken into account. It is also assumed that the manufacturing of the blocks occurs after the transport, on the construction site. This leads to applying the standard costs of extraction, transport and manufacture to the volumes of stone before the loss generated by the manufacture itself, estimated to be 15 per cent more than the volume of the final block (Shaw 2009: 31).

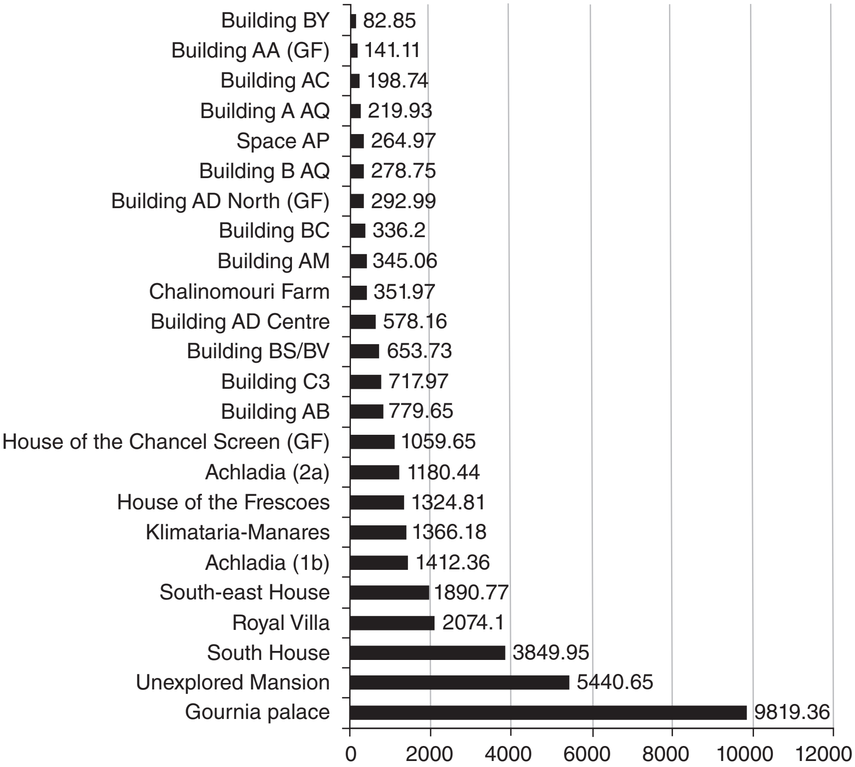

Fig. 4.1. Total labour-time requirements for the buildings selected, expressed in person-days of eight hours.

Labour-time is estimated in person-hours, in order to make more relevant comparisons with other projects that express the labour spent at a task in hours (or in person-days but mention the length of the working days). Ethnographic data suggest working days ranging between five and ten hours, a variety explained by the climatic conditions, the strenuousness of the task, or the socio-political context within which the project takes place (Aaberg and Bonsignore 1975: 46; Abrams 1994: 43; Ashbee and Cornwall 1961: 133; Erasmus 1965: 43; La Rosa 2002: 81; Techniques rurales 1971: 305). The use of eight hours a day has been used here because it provides a recurring intermediate value (Fig. 4.1).

4.2.2. Limited Impact of Neopalatial Building Projects

A striking result of the application of architectural energetics to the twenty-three case-studies is the limited time necessary for making a Minoan building.

Twelve required less than 800 person-days of work to be constructed (excluding here the two cases for which only the ground floor was restored), meaning that a small crew of maximum nine individuals could have erected them within ninety days (Fig. 4.2). Ethnographic studies of agrarian societies mention an agricultural off-season of at least three months corresponding to the dry season, during which people can devote time to non-agricultural activities, including building projects (Blier 1987: 19, although Abrams suggests longer periods, Abrams 1987: 490; 1994: 43; see also Burford 1963: 33). This period is often considered the maximum duration for the construction of domestic architecture, so that a shelter is provided before the end of the dry season.

This group of 'low-cost' buildings consists of Buildings BY, AC, AP, BC, AM, AD Centre, BS/BV and AB at Pseira, Buildings A and B of the Artisans Quarter and C3 on the islet at Mochlos, and the Chalinomouri farm. They are erected with quite simple building techniques, and two characteristics of these edifices are worth pointing out. Firstly, most of them require little or no preparation of the terrain, in the form of levelling. Builders adapt to the local topography rather than transform the terrain for the sake of a more elaborate plan (Fotou 1990). Such an adaptation drastically reduces the work required, and correlates with the absence of elaborate planning features which would require specific design skills (Hitchcock 1997). A second aspect relates to the materialization of such a plan: in most of these buildings, walls are made of rubble or mudbricks. Energetically speaking, these are low-profile structures, and their limited simple materials and configuration suggest that they might have been constructed by their inhabitants. Several authors have pointed to the transmission of Minoan building practices through generations, as part of collective memory (McEnroe 1982: 13–15; 1990: 195; Palyvou 1990: 45–6; 2005: 155–6). And indeed, the technical skills necessary to construct most Minoan buildings rely on what could be described as a 'practice-based form of knowledge' that individuals learn by observing and mimicking other builders, thus acquiring embodied skills (Marchand 2009: 74) without being specialized builders. One may also consider the cooperation of the workforce from different households, which allows more builders thus shortening the project. Ethnographic examples of such cooperation exist (Dietler and Herbich 2001), and one cannot exclude that such practices occurred in Neopalatial Crete.

Even in these energetically low-profile edifices, some technical choices from the builders offer surprising results. This is especially the case with mudbricks, the use of which appears significantly more time-consuming than the use of rubble stones. The difference is important enough for the builders to have noticed it, as it amounts to one day's work for 1m^3 of wall erected in each material: 24.52 p-h/m^3 for mudbrick walls, 16.66 p-h/m^3 for rubble ones. Even more surprisingly, mudbricks are sometimes put aside as a second-choice material used for partitions or modifications in buildings, considered as

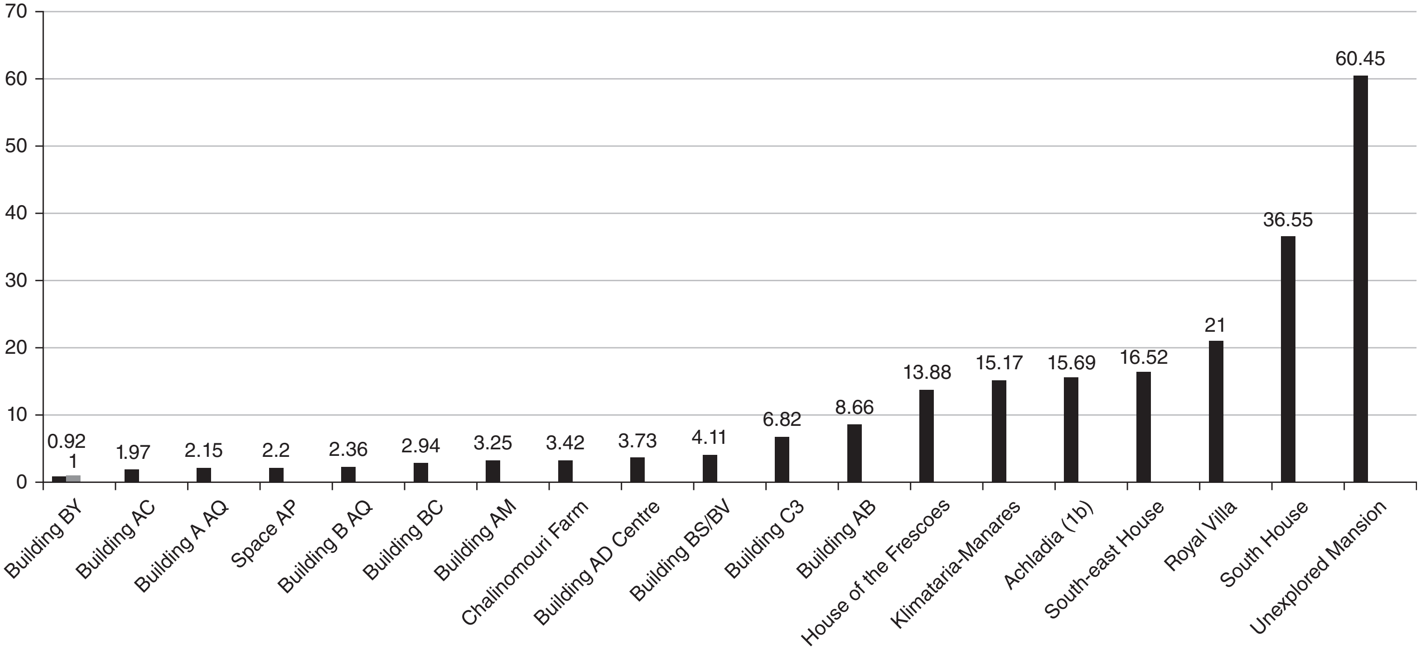

Fig. 4.2. Workforce necessary for constructing the initial phase of each building selected, considering a three-month building project, expressed in number of individuals.

structurally weak, with limited load-bearing capacity and low resistance to atmospheric conditions. The main reason for their dismissal, whether from site publications or in broader syntheses, is their general absence from excavated structures: unless they are accidentally burnt in destruction, mudbricks decompose into a reddish-brown mass making it impossible to identify individual bricks, let alone to suggest the initial aspect and position of the wall. Furthermore, we do not have substantial standing remains with which to compare the Cretan archaeological record, since at Akrotiri-Thera mudbricks are used exclusively for small partitions and not for load-bearing walls (Palyvou 2005: 114).

Microscopic observations and analysis have shown that Minoan mudbricks are typically composed of between 5 and 30 per cent of clay and minimum 40 per cent of sand particles, to which animal dung is sometimes added (Jerome 1991: table 4; Nodarou, Frederick, and Hein 2008: 3012–13). Sherds, obsidian, plaster fragments, bones, or shells are also visible to the naked eye in many mudbricks. They may have acted as temper or helped to distribute the stress within the mudbricks, but are mainly intrusions caused by the procurement of soil within the site, sometimes on the construction spot itself (Devolder 2005–6: 68–70; Guest-Papamanoli 1978: 5–6; Shaw 1973: 187). In a different way, marine plants were intentionally incorporated into the mudbricks as a binder that ensured the cohesion of the fabric (Devolder 2005–6: 69; Guest-Papamanoli 1978: 6). Such composition is observed in Early Minoan II, Protopalatial, and Neopalatial walls of the Palace at Malia, in Protopalatial Building Dessenne and Quartier Mu on the same site, in Neopalatial and Postpalatial deposits at Sissi, in Neopalatial Palaikastro, in Neopalatial walls at Gournia, and at Neopalatial Nirou Chani (personal observations; Devolder 2005–6; Guest-Papamanoli 1978: 6, n. 21; Xanthoudides 1922: 9). Recurring mudbrick recipes in these far-flung Cretan sites indicate shared building practices, but the variety in the type and proportions of the inclusions suggests brick making and building was not a specialized activity but rather part of a general know-how. The greater availability of soil on some sites may have been a main incentive for the construction of mudbrick walls, but stone is largely available as well in Crete, so we need more than physical determinism to explain why Minoan builders used a material that was significantly more time-requiring than rubble. When combined with a rubble stone base, an overhanging roof, a wooden structural framework and wall coating, mudbricks do have a significant load-bearing capacity and show undeniable benefits. They offer good resistance to lateral shocks, their thermic performance allows the slow transmission of heat or cold, they regulate humidity better than other materials, and they can resist fire destructions which might ‘freeze’ the walls instead of causing their collapse (Hadjri et al. 2007: 143; Jaquin 2010: 2; Homsher 2012: 2–3). It is also stressed that the use of moulded mudbricks makes repair easier in contrast to components less regular in shape (Marchand 2009: 83). Other, non-technical factors most likely played a prominent role. Perhaps on some sites such as Malia the use of mudbricks mainly resulted from a certain conservatism regarding building materials, whether or not their use was first triggered by the availability of raw materials.

The main features of the low-profile buildings—little or no levelling works and the use of building materials and techniques which are part of common knowledge—are precisely what set them apart from the South House, the South-east House, the Royal Villa, and the Unexplored Mansion at Knossos. Their outstanding labour-time requirements are due to three variables: their size (both the ground surface they cover and their vertical development on several floors), the levelling works prior to their construction, and the materials which make up their walls. The most characteristic and cost-generative feature of these buildings is ashlar. It makes up 74.49 per cent of the costs of the initial phase of the South House, 57.94 per cent of the costs of the initial phase of the South-east House, 24.61 per cent of the costs of the Royal Villa, 87.38 per cent of the costs of the Unexplored Mansion, and 51.58 per cent of the costs of the ground floor of the House of the Chancel Screen. Such a ratio is significant, since ashlar was quarried and cut by specialized craftsmen, possessing skills beyond the reach of those available to the average individual (Shaw 2009: 166–7; Driessen 1989–90: 20–1; Norton 2016: 216, fig. 3). Modern stone cutters stress the high degree of technical skill necessary for accomplishing tasks connected to the production of ashlar. It is even stated by professionals that after the age of 14, it is too late for an individual to get the right moves and automatic reflexes that will make for a good craftsman (J.-Cl. Bessac, personal communication).

Despite the incorporation in its second phase of ashlar walls, the palace at Gournia provides a striking example of the low impact of building projects on Minoan communities (Fig. 4.3). The construction of the western and central wings of the initial phase of this well-planned edifice, which called for some preparation and adaptation of and to the local topography, would not have required a significant number of workers: forty individuals working during three months, i.e. only 0.73 per cent of a population estimated as around 5,420 individuals at the beginning of the Neopalatial period (Devolder 2005: table E. Calculations based on Branigan 2001: 46–7, tables 3.3, 3.4; Watrous 1992: 608; Watrous and Blitzer 1999: 906; Whitelaw 2001: 27). Later modifications to this initial core, such as the western facade, central hall, and addition of a south wing largely including ashlar generated higher costs, but the estimated forty-nine workers involved in the construction of this second phase would not have impacted heavily on the community. Indeed, this number seems insignificant in regard to the site population estimates. Furthermore, a significant part of this workforce was specialized, and may thus have been called upon from other sites in Crete. Finally, the addition of the east wing and Rooms 30 and 34 to the north of it only required the participation of an

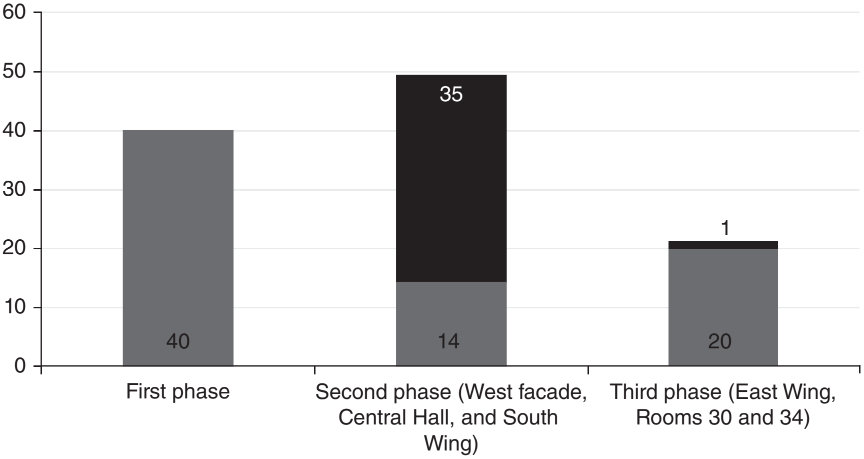

Fig. 4.3. Involvement of non-specialists (grey) and specialists (black) in the three main architectural phases of the palace at Gournia, expressed in number of individuals.

estimated twenty-one individuals. What appears especially striking is that the first edifice is built using simple building materials and practices, very similar indeed to those that make up the houses on the site: the average labour-estimates of the first phase of the palace at Gournia are 1.72 p-d/m^2 of living surface, and for House Ab on the same site are 3.79 p-d/m^2 of living surface.[2] In other words, a palace could be erected by a local, skilled but non-specialized workforce, specialists being called upon for the incorporation of elaborate masonry.

I have suggested earlier that many simple buildings could have been erected by their own inhabitants in a short period. But even in the case of the most expensive buildings, the impact of the construction project on the local communities must have been quite limited. The South House, the South-east House, the Royal Villa, and the Unexplored Mansion would have required an estimated thirty-seven, seventeen, twenty-one, and sixty workers, respectively, during three months. Compared with the available population in Neopalatial Knossos, estimated at 20,000 individuals (see chapter 7), these numbers are insignificant. The limited impact of Minoan building projects is even more obvious if the results shown in Fig. 4.1 are compared with the time necessary to erect the tholos tombs at Mycenae. Calculations by Fitzsimons indicate, in a growing order: 2,082 p-d for the Cyclopean Tomb, 4,670 p-d for the Panaghia Tomb, 5,705 p-d for the Kato Phournos Tomb, 5,858 p-d for the Epano Phournos Tomb, 6,423 p-d for the Tomb of the Genii, 9,596 p-d for the Tomb of Aigisthos, and 14,496 p-d for the Lion Tomb (Fitzsimons 2014: table 4). As these numbers indicate, several of the tholos tombs at Mycenae largely surpass even the most labour-intensive buildings in our Minoan sample.

A major distinction between Neopalatial building projects and Mycenaean ones in Mainland Greece is the labour-time devoted to the transport of materials. In a recent study, Brysbaert has shown how the transport of the Cyclopean blocks took the largest part of the construction project of the Lower Citadel wall of Tiryns (LH IIIB), which required the labour of about 100 men and five pairs of oxen during three years (Brysbaert 2013: 81; 2015b: 100, table 9). Also according to her calculations, the transport of the 23 tonne block used in the bathroom of the palace at Tiryns would have necessitated 200 men or fifty oxen pulling simultaneously for seventeen to thirty-three days (Brysbaert 2013: 77; 2015a: 81). She suggests such an event would have triggered awe among the population which no doubt would have gathered to watch the 'procession' between the quarry and the palace. Although this block is especially large, it is common to find blocks of large dimensions in the Lower Citadel wall of Tiryns. Indeed, 10 per cent of the blocks used in this fortification weighed less than 500 kg, 25 per cent between 500 kg and 2 tonnes, and 65 per cent between 2 and 13 tonnes (Brysbaert 2013: 77; 2015b: 95–7). If one looks at evidence from the Minoan side, it is difficult to imagine that events such as the procession that may have accompanied the transport of the bathroom slab at Tiryns would have occurred on Crete. In fact, it seems doubtful that transport exerted a significant constraint on Minoan building projects at all. To test this assertion, the weight of 117 sandstone blocks of the Neopalatial walls of the West Wing of the palace at Malia was estimated (Fig. 4.4), based on *in situ* measurements by the author, considering a density of 2.325 tonnes per m^3 (Schumann 1989: 226, 254, 302, 328). One hundred and thirteen of them range steadily between 100 kg and 2 tonnes, while only four exceed 2 tonnes, with none more than 3.7 tonnes. These limited weights are surprising, considering that the local provenance of the sandstone extracted on

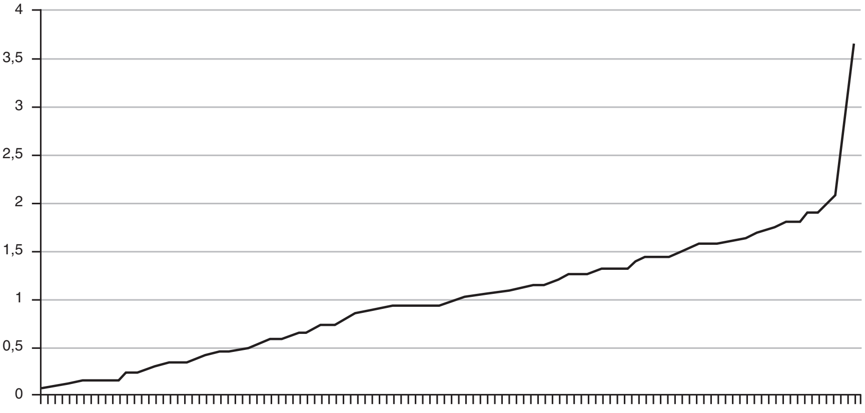

Fig. 4.4. Weight of 117 cut sandstone blocks in the west wing of the Neopalatial palace at Malia, expressed in tonnes.

the shore near the palace considerably reduced the distance over which the blocks had to be transported (Guest-Papamanoli 1989; Müller-Celka and Dalongeville 2009). The decision not to use larger blocks not only had an impact on the total labour-time requirements of the building but also reflects the scale of organization of the construction project, as there was no need to attract and organize large crews to transport the blocks as was the case for the Mycenaean tholos tombs and Cyclopean wall. The pulling force of an ox is considered equivalent to one-seventh of its weight, that is, for a 450 kg ox, 63.4 kgf or 630N (Raepsaet 1993: 260). This maximum pulling force is rendered in a formula as $T = (f + p).Q$, with 0.25 for friction coefficient f, and 0.05 for the slope p, which indicates that the charge (Q) susceptible to be pulled by a 450 kg ox is about 2100 kg (Devolder 2013: 26–7; Raepsaet 1993: 257–9). Even though the blocks at Malia tend not to weigh more than 2 tonnes, the diversity of the estimated weights shows that the builders did not use the limit imposed by the pulling capacity of an ox as a criterion for a specific block size. In some instances the size of the blocks determined their position in the edifice—the largest blocks in the western magazines of the palace at Malia are used in the southern facade—but elaboration was rather expressed in the care taken in their shaping and assembling. It is doubtful that such practice reveals the lack of organizational capacity of Minoan building commissioners, but could rather mark their lack of interest in the expression of monumentality through sheer size of the individual building components.

4.2.3. Linear Distribution of the Energy Expenditure

The total labour-time requirements obtained here range steadily between 83 and 9,819 p-d. The linear distribution of the results in Fig. 4.1 underlines the existence of a marked continuum in the 'time-requirements' of Neopalatial architectural production. The absence of a marked separation between a reduced number of high-time-requiring buildings and a mass of low-time-requiring ones had already been pointed out by McEnroe (2010: 4), who had stressed the 'basically homogeneous series' formed by Neopalatial architecture. While corroborating this assertion, architectural energetics also sheds light on the various building practices that generated such diversity in labour-time requirements. I have referred earlier to distinct types of building, characterized by various material and technical choices and the specialized or unspecialized status of the workforce. Three buildings, the labour-requirements of which are triggered by different parameters, seem to belong to none of these fluid categories.

The labour requirements of the building at Klimataria-Manares mainly result from the considerable volume of walls built in rubble or unworked blocks, which might be explained by the necessity to stabilize the building erected on four terraces. Such planning decisions allowed for a reduction in the time devoted to levelling (2.29 per cent of the total cost), but increased the proportion taken by the rubble and unworked stone masonry: these make up 84 per cent of the building's total labour-time requirements. Some walls were built in pseudo-ashlar (i.e. only the outer face of the block was dressed, Mantzourani, Vavouranakis, and Kanellopoulos 2005: 755), but it is likely that the builders were trying to minimize this time-requiring masonry as it only appears in the area of the main entrance. The reduced quantities of worked stone indicate that none of the estimated sixteen individuals necessary for fulfilling the building project in a reasonable amount of time needed to be specialized builders. Rather, the labour-time requirements of the building at Klimataria-Manares indicate that it was the result of a medium-scale, skilled but generally unspecialized workforce. In an opposite manner the labour-time requirements of the House of the Frescoes are mostly related to the volumes of ashlar masonry that make up its walls, the construction of which amounts to 60 per cent of the labour-time requirements of the first phase. The reason why it does not appear alongside the Knossian buildings of an upper 'energetics' category is that the total ground surface and volumes of the building are quite reduced. This might be related to the high density of occupation in the area of the site at the time of the construction of the House of the Frescoes (Evans 1928: 444), which left little room for choice as to the size and volume of the building. The workforce involved in this project must however have been at least partly specialized, in marked contrast to the building at Klimataria-Manares, and despite the fact that the latter was more time-consuming than the House of the Frescoes (Fig. 4.5). At Achladia, higher costs are due to the levelling works that took place before the construction of the building. The levelling operations and the

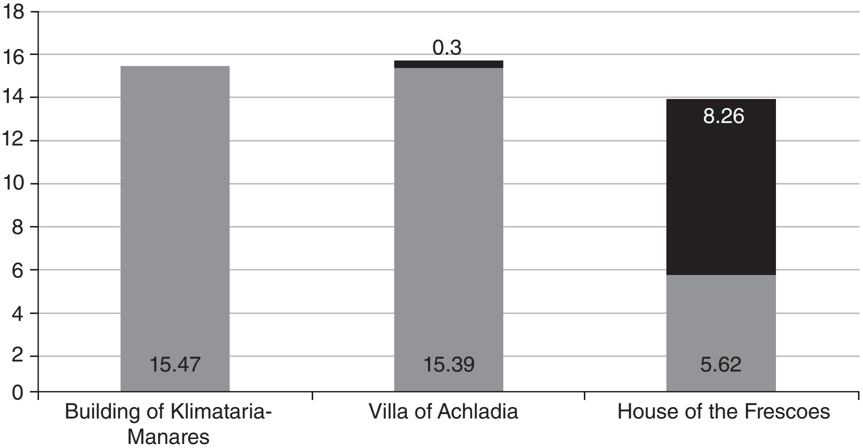

Fig. 4.5. Specialized (black) vs unspecialized (grey) necessary workforce for the construction of the Building of Klimataria-Manares, the Villa of Achladia, and the House of the Frescoes, expressed in number of individuals.

construction of retaining walls make up 23 per cent of the total labour-time requirements, and made possible the careful layout of the plan along a modular grid. The materials that compose the walls do not, however, show any sign of elaboration, and ashlar limestone pillars represent less than 2 per cent of the total labour-time requirements of the building. The main part is taken by rubble, unworked blocks, and mudbrick walls. So here no specialized man-power is really perceptible, except perhaps in the planning of the edifice, which triggered increased levelling works.

Although it was used lavishly in the Knossian cases considered here, ashlar was generally reserved for the most visible and significant parts of the edifices, This is the case in the palace at Gournia where cut sandstone forms the west facade, the south wing on the public court and the central hall (see chapter 9). Interestingly, the use of ashlar is not limited to the most labour-time requiring buildings: it appears in small quantities in Building BC at Pseira, where the bases of the 'Minoan hall' are made of cut sandstone (0.13 m^3), in the renovation of the entrance of Building C3 at Mochlos (2.42 m^3), and in the cut limestone pillars of the building at Achladia (2.47 m^3). Taking into consideration the whole of the Neopalatial record, cases where a limited amount of ashlar is used are not uncommon.[3] It might point to the fact that access to cut stones (i.e. to quarries and specialists able to work such blocks) was not restricted exclusively to a certain type of edifices or a particular social group. At Knossos, local gypsum and limestone quarries provided a favourable geological environment for the development of ashlar architecture that might, among other factors, explain the lavish use of this material on the site.

4.3. CONCLUSION

Even if a broad range of social motivations and factors inherent to the construction processes are omitted in the materialist approach adopted here (Dobres 1995, 2000: 41; Lemonnier 1993; Price 1982), architectural energetics proves to be a worthwhile method for assessing the technical constraints at play during the building project. The two main arguments that this approach allows concerning the Minoan architectural record are: a) the low impact of building projects on Minoan communities, and b) the linear distribution of labour-time estimates. My study has also established the significant time-requirements not only concerning the production of ashlar, but also, more surprisingly, of mudbricks. But despite the use in some cases of these time-consuming building techniques, the energetic assessments in our case-studies suggest a strikingly low energy expenditure in building. They illustrate the limited impact of building construction on Minoan communities, as indicated by the small size of the estimated workforce. This pattern differs substantially from what we see in the building projects of broadly contemporaneous neighbouring societies. In marked contrast with Near Eastern and Egyptian civilizations and, as growing evidence suggests, with the Mycenaean mainland, Minoan building projects required no management of large working crews. Such a pronounced difference in scale questions the validity of the analogies developed when discussing architecture in the broader eastern Mediterranean. To put it another way, how far can we extrapolate information from building projects in Mycenaean Greece, the Near East and Egypt for understanding Late Bronze Age Cretan ones? The written and iconographic record of Bronze Age Mediterranean civilizations outside Crete provides a wide array of ideas, data, and images to help us fill in the gaps in our knowledge on the production of Minoan architecture (Heimpel 2009; Nakassis 2013; de Garis Davies 1943). But the results from architectural energetics remind us of the need to assess such data against the specificities of the Minoan built environment. In addition to conclusions regarding the scale of Minoan building projects, the linear distribution of the labour-time estimates has shown that there is no marked segregation between categories of buildings as far as architectural energetics is concerned. Some trends were highlighted, especially regarding the status of the builders and their choices of specific materials and techniques, but these were flexible and triggered by different parameters. Rather, the homogeneity of the results points to the fact that there was no controlled access to material and human building resources.

NOTES

1. For Achladia two possible restitutions were taken into account into the interpretation of the results (Mantzourani and Vavouranakis 2005: figs 13 and 14), while in three cases only the ground floor costs were estimated: Buildings AA and AD North at Pseira and the House of the Chancel Screen at Knossos.
2. For the first phase of the Palace: 3,302.35 p-d (excluding levelling works) for a total living surface of 1,917.29 m^2; for House Ab: 564.71 p-d (excluding levelling works) for a total living surface of 149 m^2.
3. For example: the 'villa' at Sklavokambos (Marinatos 1939/1941: 72, fig. 6), Building 5 at Palaikastro (Driessen 2000: 36), and the buildings at Makryghialos, Zou, or Tourtouloi (Driessen 1989–90: 12).

REFERENCES

Aaberg, S. and J. Bonsignore. 1975. 'A Consideration of Time and Labor Expenditure in the Construction Process at the Teotihuacan Pyramid of the Sun and the Poverty

Point Mound'. In *Three Papers on Mesoamerican Archaeology*, edited by J. A. Graham and R. F. Heizer. Contributions of the University of California Archaeological Research Facility 24. Berkeley, CA: University of California: 40–78.

Abrams, E. M. 1984a. 'Systems of Labor Organization in Late Classic Copan, Honduras: The Energetics of Construction'. PhD dissertation. Pennsylvania State University.

Abrams, E. M. 1984b. 'Replicative Experimentation at Copan, Honduras: Implications for Ancient Economic Specialization'. *Journal of New World Archaeology* 6: 39–48.

Abrams, E. M. 1987. 'Economic Specialization and Construction Personnel in Classic Period Copan, Honduras'. *American Antiquity* 52: 485–98.

Abrams, E. M. 1989. 'Architecture and Energy: An Evolutionary Perspective'. In *Archaeological Method and Theory*, edited by M. Schiffer. Tucson, AZ: University of Arizona Press: 47–88.

Abrams, E. M. 1994. *How the Maya Built Their World: Energetics and Ancient Architecture*. Austin, TX: University of Texas Press.

Abrams, E. M. 1995. 'A Model of Fluctuating Labor Value and the Establishment of State Power: An Application to the Prehispanic Maya'. *Latin American Antiquity* 6: 196–213.

Abrams, E. M. and T. W. Bolland. 1999. 'Architectural Energetics, Ancient Monuments, and Operations Management'. *Journal of Archaeological Method and Theory* 6: 263–91.

Adams, R. N. 1975. *Energy and Structure*. Austin, TX: University of Texas Press.

Andrews, E. B. 1877. 'Report of Explorations of Mounds in Southeastern Ohio'. *Tenth Annual Report of the Trustees of the Peabody Museum of American Archaeology and Ethnology* 2: 51–74.

Arco, L. J. and E. M. Abrams. 2006. 'An Essay on Energetics: The Construction of the Aztec Chinampa System'. *Antiquity* 80: 906–18.

Arnold, J. and A. Ford. 1980. 'A Statistical Examination of Settlement Patterns at Tikal, Guatemala'. *American Antiquity* 45: 713–26.

Ashbee, P. and I. A. Cornwall. 1961. 'An Experiment in Field Archaeology'. *Antiquity* 35, 129–34.

Blier, S. P. 1987. *The Anatomy of Architecture: Ontology and Metaphor in Batammaliba Architectural Expression*. Cambridge: Cambridge University Press.

Branigan, K. 2001. 'Aspects of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 38–50.

Brysbaert, A. 2013. 'Set in Stone? Socio-Economic Reflections on Human and Animal Resources in Monumental Architecture of Late Bronze Age Tiryns in the Argos Plain, Greece'. *Arctos* 47: 49–96.

Brysbaert, A. 2015a. '"Set in Stone"? Technical, Socio-Economic and Symbolic Considerations in the Construction of the Cyclopean-Style Walls of the Late Bronze Age Citadel at Tiryns, Greece'. In *Excerpta Archaeologica Leidensia*, edited by C. Bakels and H. Kamermans. Leiden: Publication of the Faculty of Archaeology, Leiden University: 69–90.

Brysbaert, A. 2015b. '"Set in Stone"? Constructed Symbolism Viewed through an Architectural Energetics' Lens at Bronze Age Tiryns, Greece'. In *Excerpta Archaeologica Leidensia*, edited by C. Bakels and H. Kamermans. Leiden: Publication of the Faculty of Archaeology, Leiden University: 91–105.

Burford, A. 1963. 'The Builders of the Parthenon'. In *Parthenos and Parthenon* (Greece and Rome Supplement 10). Oxford: Clarendon Press: 23–35.

Carmean, K. 1991. 'Architectural Labor Investment and Social Stratification at Sayil, Yucatan, Mexico'. *Latin American Antiquity* 2: 151–65.

Cheek, C. 1986. 'Construction Activity as a Measurement of Change at Copan, Honduras'. In *The Southeast Maya Periphery*, edited by P. Urban and E. Schortman. Austin, TX: University of Texas Press: 50–71.

Cook, S. F. 1947. 'The Interrelation of Population, Food Supply, and Building in Pre-Conquest Central Mexico'. *American Antiquity* 13: 45–52.

Cotterell, B. and J. Kamminga. 1990. *Mechanics of Pre-industrial Technology*. Cambridge: Cambridge University Press.

Cottrell, F. 1955. *Energy and Society: The Relation between Energy, Social Change, and Economic Development*. New York: McGraw-Hill.

Craig, D. B., J. P. Holmlund, and J. J. Clark. 1998. 'Labor Investment and Organization in Platform Mound Construction: A Case Study from the Tonto Basin of Central Arizona'. *Journal of Field Archaeology* 25: 245–59.

DeLaine, J. 1997. 'The Baths of Caracalla: A Study in the Design, Construction, and Economics of Large-Scale Building Projects in Imperial Rome'. *Journal of Roman Archaeology Supplementary series* 25.

Devolder, M. 2005. 'Hâte-toi de bâtir la demeure, hâte-toi d'édifier le palais'. *Creta Antica* 6: 165–86.

Devolder, M. 2005–6. 'From the Ground Up: Earth in Minoan Construction. The Case of Building 5 at Palaikastro'. *Aegean Archaeology* 8: 65–80.

Devolder, M. 2009. 'Composantes et interactions sociales en Crète néopalatiale. Investigation des données archéologiques'. PhD dissertation. Louvain-la-Neuve: Université catholique de Louvain.

Devolder, M. 2012. 'Labour Costs and Neopalatial Architecture: A Study of the Buildings at Klimataria-Manares and Achladia and the Palace at Gournia'. In *Minoan Realities: Theory-based Approaches to Images and Built Spaces as Indicators of Minoan Social Structures* (Aegis 5), edited by D. Panagiotopoulos and U. Gükel-Maschek. Louvain-la-Neuve: Presses universitaires de Louvain: 165–79.

Devolder, M. 2013. *Construire en Crète minoenne: Une approche énergétique de l'architecture néopalatiale* (Aegaeum 35). Leuven: Peeters.

Devolder, M. 2015. 'Manpower and Neopalatial Architecture: The Architectural Project as a Meaningful Experience'. In *Minoan Archaeology. Perspectives for 21st Century* (Aegis 8), edited by D. Panagiotopoulos, U. Gükel-Maschek, and S. Cappel. Louvain-la-Neuve: Presses universitaires de Louvain: 241–52.

Dietler, M. and I. Herbich. 2001. 'Feasts and Labor Mobilization: Dissecting a Fundamental Economic Practice'. In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by M. Dietler and B. Hayden. Washington, DC: Smithsonian Institution Press: 240–64.

Dobres, M.-A. 1995. 'Gender and Prehistoric Technology: On the Social Agency of Technical Strategies'. *World Archaeology* 27: 25–49.

Dobres, M.-C. 2000. *Technology and Social Agency: Outlining a Practice Framework for Archaeology*. Oxford: Blackwell.

Driessen, J. M. 1989–90. 'The Proliferation of Minoan Palatial Architectural Style: (I) Crete'. *ActaArchLov* 28–9: 3–23.

Driessen, J. M. 2000. 'The Architectural Environment'. In *The Palaikastro Kouros: A Minoan Chryselephantine Statuette and its Aegean Bronze Age Context* (BSA Studies 6), edited by J. A. MacGillivray, L. H. Sackett, and J. M. Driessen. London: British School at Athens: 35–50.

ECAFE (Economic Commission for Asia and the Far East). 1957. *Manual Labour and Its More Effective Use in Competition with Machines for Earthwork in the ESCAFE Region*. Manila, United Nations E/CN.n/conf.3/L.I.

Erasmus, C. 1965. 'Monument Building: Some Field Experiments'. *Southwestern Journal of Anthropology* 21: 277–301.

Evans, A. J. 1928. *The Palace of Minos*. London: Macmillan.

Fathy, H. 1970. *Construire avec le peuple*. Paris: Sindbad.

Feinman, G. M. 1996. 'Review of E. M. Abrams (1994) *How the Maya Built Their World: Energetics and Ancient Architecture*. Austin, University of Texas Press'. *Hispanic American Historical Review* 76: 340–1.

Fitzsimons, R. D. 2014. 'An Energetic(s) Approach to Late Helladic Tomb Construction: Funerary Architecture and State Formation at Bronze Age Mycenae'. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond, Proceedings of a Colloquium in Memory of Frederick E. Winter, Athens, 22–23 June 2012*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 83–120.

Fotou, V. 1990. 'L'implantation des bâtiments en Crète à l'époque néopalatiale: aménagement du terrain et mode d'occupation du sol'. In *L'habitat égéen préhistorique. Actes de la table ronde internationale, Athènes, 23–25 juin 1987*, edited by P. Darcque and R. Treuil. Paris: École française d'Athènes: 45–73.

Fotou, V. 1997. 'Éléments d'analyse architecturale et la question des fonctions de trois bâtiments–"villas": la Royal Villa, le "Mégaron" de Nirou et le "Mégaron" de Sklavokambos'. In *The Function of the 'Minoan Villa', Proceedings of the Eighth International Symposium at the Swedish Institute at Athens, 6–8 June 1992*, edited by R. Hägg. Stockholm: Svenska Institutet i Athen: 33–50.

Garis Davies, N. de. 1943. *The Tomb of Rekh-mi-rê at Thebes*. New York: Metropolitan Museum of Art.

Guest-Papamanoli, A. 1978. 'L'emploi de la brique crue dans le domaine égéen à l'époque néolithique et à l'Âge du Bronze'. *Bulletin de Correspondance Hellénique* 102: 3–24.

Guest-Papamanoli, A. 1989. 'Les carrières de grès dunaire à Malia'. *Bulletin de Correspondance Hellénique* 113: 113–22.

Hadjri, K., M. Osmani, B. Baiche, and C. Chifunda. 2007. 'Attitudes Towards Earth Building for Zambian Housing Provision'. *Engineering Sustainability* 160: 141–9.

Hard, R. J., J. E. Zapata, B. K. Moses, and J. R. Roney. 1999. 'Terrace Construction in Northern Chihuaha, Mexico: 1150 B.C. and Modern Experiments'. *Journal of Field Archaeology* 26: 129–46.

Heimpel, W. 2009. *Workers and Construction Work at Garsana*. Bethesda, MD: CDL Press.

Heizer, R. F. 1960. 'Agriculture and the Theocratic State in Lowland Southeastern Mexico'. *American Antiquity* 26: 215–22.

Heizer, R. F. 1966. ‘Ancient Heavy Transport, Methods and Achievements’. *Science* 53: 821–30.

Hitchcock, L. A. 1997. ‘The Best Laid Plans go Astray: Modular (Ir)regularities in the “Residential Quarters” at Phaistos’. In *TEXNH: Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age. Proceedings of the 6th International Aegean Conference, Philadelphia, Temple University, 18–21 April 1996* (Aegaeum 16), edited by R. Laffineur and P. Betancourt. Liège: Université de Liège: 243–50.

Homsher, R. S. 2012. ‘Mud Bricks and the Process of Construction in the Middle Bronze Age Southern Levant’. *Bulletin of the American School of Oriental Research* 368: 1–27.

Humboldt, A. von. 1816. *Vues des cordillères et monuments des peuples indigènes de l’Amérique*. Paris: N. Maze.

Jaquin, P. A. 2010. ‘How Mud Bricks Work: Using Unsaturated Soil Mechanics Principles to Explain the Material Properties of Earth Buildings—A Year of Research’. In *EWB-UK National Research Conference 2010 ‘From Small Steps to Giant Leaps…Putting Research into Practice’. Hosted by The Royal Academy of Engineering, 19 February 2010*. <http://www.hedon.info/EWBResearchConference2010>.

Jerome, P. 1991. ‘Analysis and Conservation of Mudbrick Construction in Bronze Age Crete’. Master’s Thesis. Columbia University.

Kaplan, D. 1963. ‘Men, Monuments, and Political Systems’. *Southwestern Journal of Anthropology* 19: 397–410.

Klapisch-Zuber, C. 1969. *Les maîtres du marbre, Carrare 1300–1600*. Paris: Éditions de l’EHESS.

Kowalski, J. K. 1995. ‘Review of Abrams, E. M. (1994), “How the Maya Built Their World: Energetics and Ancient Architecture”. Austin, University of Texas Press’. *Journal of the Society of Architectural Historians* 54: 368–70.

Kozelj, T. 1988. ‘Extraction of Blocks in Antiquity: Special Methods of Analysis’. In *Classical Marble: Geochemistry, Technology, Trade*, edited by N. Herz and M. Waelkens. Dordrecht: Springer: 31–9.

La Rosa, V. 2002. ‘Pour une révision préliminaire du second palais de Phaistos’. *Monuments of Minos. Rethinking the Minoan Palaces. Proceedings of an International Workshop held in Louvain-la-Neuve, 2001* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 71–97.

Lemonnier, P. 1993. *Technological Choices: Transformation in Material Cultures since the Neolithic*. London: Routledge.

Mantzourani, E. and G. Vavouranakis. 2005. ‘Achladia and Epano Zakros: A Re-Examination of the Architecture and Topography of Two Possible Minoan Villas in East Crete’. *Opuscula Atheniensia* 30: 99–125.

Mantzourani, E., G. Vavouranakis, and C. Kanellopoulos. 2005. ‘The Klimataria-Manares Building Reconsidered’. *American Journal of Archaeology* 109: 743–76.

Marchand, T. H. J. 2009. ‘Negotiating Licence and Limits: Expertise and Innovation in Djenné’s Building Trade’. *Africa* 79: 71–91.

Marinatos, S. 1939/1941. ‘*Το Μινωικόν Μϵγάρον Σκλαβοκαμπού*’. *Archaiologike Ephemeris* 1939/1941: 69–96.

McEnroe, J. C. 1982. ‘A Typology of Minoan Neopalatial Houses’. *American Journal of Archaeology* 86: 3–17.

McEnroe, J. C. 1990. 'Significance of Local Styles in Minoan Vernacular Architecture'. In *L'habitat égéen préhistorique. Actes de la table ronde internationale, Athènes, 23–25 juin 1987*, edited by P. Darcque and R. Treuil. Paris: École française d'Athènes: 195–202.

McEnroe, J. C. 2001. *Pseira V. The Architecture of Pseira*. Philadelphia, PA: INSTAP Academic Press.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Müller-Celka, S. and R. Dalongeville. 2009. 'Les calcarénites dunaires littorales en Méditerranée orientale : formation, propriétés, exploitation'. In *Leukos lithos: Marbres et autres roches de la Méditerranée antique: études interdisciplinaires*, edited by P. Jockey. Paris: Maisonneuve & Larose, Maison méditerranéenne des sciences de l'homme: 143–60.

Nakassis, D. 2013. *Individuals and Society in Mycenaean Pylos*. Leiden: Brill.

Nodarou, E., C. Frederick, and A. Hein. 2008. 'Another (Mud)brick in the Wall: Scientific Analysis of Bronze Age Earthen Construction Materials from East Crete'. *Journal of Archaeological Science* 35: 2997–3015.

Norton, S. 2016. 'Developing Sustainable Skills Conservation at Fountains Abbey'. In *Heritage Counts*, edited by K. Van Balen and A. Vandesande. Antwerp: Garant: 211–20.

Palyvou, C. 1990. 'Architectural Design at Late Cycladic Akrotiri'. In *Thera and the Aegean World III,* vol. 1, edited by D. Hardy, C. Doumas, J. Sakellarakis, and P. Warren, London: Thera Foundation: 44–56.

Palyvou, C. 2005. *Akrotiri Thera:. An Architecture of Affluence 3,500 Years Old*. Philadelphia, PA: INSTAP Academic Press.

Pegoretti, G. 1843. *Manuale pratico per l'estimazione dei lavori architettonici, stradali, idraulici e di fortificazione, per l'uso degli ingegneri ed architetti*. Milan: Presso l'Editore Librajo Angelo Monti.

Price, B. 1982. 'Cultural Materialism: A Theoretical Review'. *American Antiquity* 47: 709–41.

Pyburn, K. A. 1996. 'Review of Abrams, E. M. (1994), "How the Maya Built Their World: Energetics and Ancient Architecture". Austin, University of Texas Press'. *American Anthropologist* 98: 662–3.

Raepsaet, G. 1993. 'Le diolkos de l'Isthme à Corinthe: son tracé, son fonctionnement'. *Bulletin de correspondance hellénique* 117: 233–61.

Rea, J. T. 1913. *How to Estimate*. London: Batsford.

Reynolds, P. J. 2006. 'The Scientific Basis for the Reconstruction of Prehistoric and Protohistoric Houses'. *euroREA* 3: 58–68.

Ristvet, L. 2007. 'The Third Millenium City Wall at Tell Leilan, Syria: Identity, Authority, and Urbanism'. *Power and Architecture: Monumental Public Architecture in the Bronze Age Near East and Aegean,* edited by J. Bretschneider, J. Driessen, and K. Lerberghe. Louvain: Peeters: 183–211.

Rougié-Blanc, S. 2014. 'Compte-rendu de Devolder, M. (2013) *Construire en Crète minoenne. Une approche énergétique de l'architecture néopalatiale* (Aegaeum 35). Leuven: Peeters'. *Revue des études anciennes* 116: 259–65.

Schumann, W. 1989. *Guide des pierres et des minéraux*. Lausanne: Delachaux et Niestlé.

Shaw, J. W. 1973. *Minoan Architecture: Materials and Techniques*. Rome: Istituto Poligrafico dello Stato.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. 2nd edn. Padua: Bottega d'Erasmo.

Soles, J. S. 1991. 'The Gournia Palace'. *American Journal of Archaeology* 95: 17–78.

Squier, E. G. and E. H. Davis. 1848. *Ancient Monuments of the Mississippi Valley, Comprising the Results of Extensive Original Surveys and Explorations*. Washington, DC: Smithsonian.

Stark, B. L. 1984. 'Review of Leventhal, R. M. and Kolata A. L. (eds). 1983. *Civilization of the Ancient Americas: Essays in Honor of Gordon R. Willey*. Albuquerque: University of New Mexico Press and Peabody Museum of Archaeology and Ethnology (Harvard)' and 'Vogt, E. Z. and Leventhal R. M. (eds). 1983. *Prehistoric Settlement Patterns: Essays in Honor of Gordon R. Willey*. Albuquerque: University of New Mexico Press and Peabody Museum of Archaeology and Ethnology (Harvard)'. *American Anthropologist* 86: 758–60.

Startin, D. W. A. 1978. 'Linear Pottery Culture Houses: Reconstruction and Manpower'. *Proceedings of the Prehistoric Society* 44: 143–60.

Stephens, J. L. 1841. *Incidents of Travel in Central America, Chiapas and Yucatan*. New York: Dover.

Stocks, D. A. 2001. 'Testing Ancient Egyptian Granite-Working Methods in Aswan, Upper Egypt'. *Antiquity* 75: 89–94.

Techniques rurales (1971). *Techniques rurales en Afrique: Manuel de culture avec traction animale*. Techniques rurales en Afrique. Paris: La documentation française.

Trigger, B. G. 1990. 'Monumental Architecture: A Thermodynamic Explanation of Symbolic Behaviour'. *World Archaeology* 22: 119–32.

Tsakanika-Theohari, E. 2006. '*Ο Δομικός Ρόλος του Χύλου στην Τοιχοπιία των Ανακτορικού Τύπου Κτιρίων της Μινωικής Κρήτης*'. PhD dissertation. National Technical University of Athens.

Usher, A. P. 1954. *A History of Mechanical Invention*. 2nd edn. Cambridge, MA: Harvard University Press.

Watrous, L. V. 1992. 'The Gournia Survey 1992 Season'. *Archaiologikon Deltion* 47: 607–8.

Watrous, L. V. and H. Blitzer. 1999. 'The Region of Gournia in the Neopalatial Period'. In *Meletemata: Studies in Aegean Archaeology Presented to Malcolm H. Wiener as He Enters His 65th Year* (Aegaeum 20), edited by P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier. Liège: Université de Liège: 905–9.

Webster, D. 1985. 'Surplus, Labor, and Stress in Late Classic Maya Society'. *Journal of Anthropological Research* 41: 375–99.

Webster, D. 1997. 'Review of Abrams, E. M. (1994), "How the Maya Built Their World: Energetics and Ancient Architecture". Austin, University of Texas Press'. *Latin American Research Review* 32: 219–32.

Webster, G. 1991. 'Monuments, Mobilization, and Nuragic Organization'. *Antiquity* 65: 840–56.

Webster, G. and Kirker, J. 1995. 'Too Many Maya, Too Few Buildings: Investigating Construction Potential at Copán, Honduras'. *Journal of Anthropological Research* 51: 363–87.

White, L. A. 1949. *The Science of Culture: A Study of Man and Civilization*. New York: Farrar, Straus.

White, L. A. 1959. 'The Concept of Culture'. *American Anthropologist* 61: 227–51.

Whitelaw, T. M. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Wright, J. C. 1987. 'Death and Power at Mycenae: Changing Symbols in Mortuary Practice'. *Thanatos: Les coutumes funéraires en Égée à l'âge du Bronze. Actes du colloque de Liège, 21–23 avril 1986* (Aegaeum 1), edited by R. Laffineur. Liège: Université de Liège: 171–84.

Wulff, H. E. 1966. *The Traditional Crafts of Persia: Their Development, Technology, and Influence on Eastern and Western Civilizations*. Cambridge, MA: MIT Press.

Xanthoudides, S. 1922. '*Μινωικόν μέγαρον Νίρου*'. *Archaiologike Ephemeris* 1922: 1–25.

5

Understanding Minoan In-House Relationships on Late Bronze Age Crete

Jan Driessen

5.1. INTRODUCTION

Houses, space, and architecture are ways through which identities and social relations are enacted and performed; they produce and support practices that themselves are needed to reproduce or generate identities and interpersonal associations. As archaeologists, we are especially interested in the ways static structures can be used to identify ever-changing social relations; and this chapter is an attempt to approach the architectural configurations and spatial organization of larger residential complexes of Minoan Crete more socially and to see what structured these (Ensor 2013). My aim is to advance our knowledge on the micro-scale of proximate interactions, in other words what the evidence is for in-house relationships. As such it may help in an eventual peopling of the past.

For a house to become a home, more than an architectural form is needed.[1] Hence the linkage of house and household and the need for a house to become a social unit, the place of reproduction, socialization, and the setting of primary social and economic dealings. In this sense, the house as a home is also a nexus of social and economic activities and hence achieves a political importance since its roles in production and consumption are pivotal to the amalgamated whole which is the community. He who rules the home, rules the community. The house *is* the society. Throughout the different periods of Minoan civilixation, houses are given great prominence and many of them are striking architectural creations, surprising because of their size, design, elaboration, and decoration, clear signs of the significance of houses in interpersonal relationships. They are unmistakably *more* than physical residences; they are also transcendent categories with a life of their own (Bloch 2010: 156–7). Houses stand for social groups and are symbolic foci, something also underlined by J. D. Schloen (2007) in his monograph *The House of the Father as Fact and Symbol: Patrimonialism in Ugarit and the Ancient Near East*. The scaling up of basic social units (Schloen 2007; Knappett 2009) composing Near Eastern societies is something which has also convincingly been suggested for Minoan Crete (Adams 2005),[2] whereas Schloen's use of the terms 'House of the Father' and 'patrimonial' makes allusion to Max Weber's patriarchal household. With regard to the internal make-up of the social groups, much of Schloen's discussion was based on a textual analysis of the composition of Ugaritic urban and rural families, with their 'preference for patrilocal residence, reflected in the presence of three-generation joint families in a substantial proportion of Ugaritian households' (Schloen 2007: 328). Schloen (2007: 331) then used the size of the dwellings as well as the available living space to suggest an average of 8.6 or 10.7 persons per house, depending whether each person had either 8 or 10 m^2 of living space. Some really sizeable houses would have been inhabited by very large households of forty-three to sixty persons but these could probably have also comprised slaves and retainers (Schloen 2007: 335). Although some have used serving vessels to reconstruct the size and make-up of Minoan residential social groups (e.g. Platon 2011: 158), this method—using the size of dwellings—is also the one used by Todd Whitelaw (2001, 2007; see also chapter 7) to reconstruct a nuclear family as occupying the average Minoan house size of *c.* 70 m^2 at Gournia.

House size has also been at the basis of my alternative hypothesis to suggest the presence, besides nuclear households, of intermediate and even very large social and symbolic units, corresponding to what have been called 'Houses' in anthropological literature on House societies or house-based societies (Driessen 2010).[3] This hypothesis was based on a variety of evidence including the sheer importance residential structures were given in Minoan culture, the uncommonly large size of a fair number of buildings, the collective burial customs, and some other characteristics. But rather than adding another label and seeing it as a closed and fixed category, I consider the identification and potential existence of Houses as a first step towards a better understanding of social groups on Minoan Crete and as an intellectual preparation to comprehend kinship relations. Since the reconstruction of the latter on the basis of archaeological data, similar to what has been proposed recently for Hohokam society, is a complex process (Ensor 2013; Driessen 2015), it seems more appropriate to underline certain recurring characteristics of these large residential structures on Crete. I firmly believe that such Minoan Houses can be compared to what have been called 'memory palaces' in non-industrial societies (Fox 1993: 4) or 'History Houses' at Çatalhöyük (Hodder and Pels 2010: 164)[4]—buildings which accumulated more transcendent knowledge and symbolic capital than others. Hence, the House stands not only for a physical structure that is built, rebuilt, and modified through time but also as the container of a social group—a household whose actual members live in or are affiliated with it at a particular moment in time but is also the embodiment of a temporally more extended intergenerational lineage, an accumulation of past events and hence of a group that uses the physical structure as a mnemonic device (Hodder and Pels 2010: 183; see also chapter 8), a transcendent category. History is made through intergenerational use, palimpsestic rebuilding, and locus-boundedness but it also brings along features of transmission, heritage, and property which are lineage-related practices. Ancestral practices too may have been connected to this focal unit, which would explain the occasional discovery of skeletal parts in Minoan houses. And, as I have tried to show for Palaikastro, the main unit of a block seems to have acted as the ritual focus for the entire group where commensality and religious practices that served group integration took place (Driessen 2010; Jusseret et al. 2013).

5.2. LATE MINOAN III CRETE AND BEFORE

Since 2007, the Belgian School at Athens has been excavating the site of Kephali at Sissi, a settlement which was in use at least between Early Minoan IIA and Late Minoan IIIB (Driessen et al. 2009, 2011, 2013). Sissi is only 4 km east of Malia and both sites remained occupied into the thirteenth century BCE and preserve good archaeological and architectural contexts to allow a comparison. Leaving aside the annex E, on the south side of a court which may have served a larger community, the main building CD on top of the hill at Sissi seems at some stage during its use life to have been a single unified building in which, taking into account the plan and circulation pattern, three sectors can be distinguished (Fig. 5.1): the north wing with the main hall 3.1 and its annexes (4.8, 4.9, and 4.14) as well as an entrance porch formed by space 4.4; a south wing centred on pillar hall 4.11 with its annexes (3.2, 3.7, 3.8, 4.12, 4.13, and 4.17) and an entrance formed by a possible porch in 4.18; and a wing without central space and with a more functional nature which also provides a spatial link between the other wings (3.3, 3.4, 3.5, 3.6, 3.11, 4.7, and 4.10).

Both the north and south wings are organized around what Letesson (2014: 58) calls a 'pole of convergence', a room through which all traffic has to pass, here formed by a hall with double internal support the function of which was, undoubtedly, also to provide space for the gathering of people. Furthermore, in terms of architecture and spatial configuration, the north and south wings resemble one another and may therefore have been functionally similar. The accessibility for both areas is more or less identical which also means that they provide equal access to the rest of the building. At the same time it is clear that no efforts were made to provide easy communication between the two

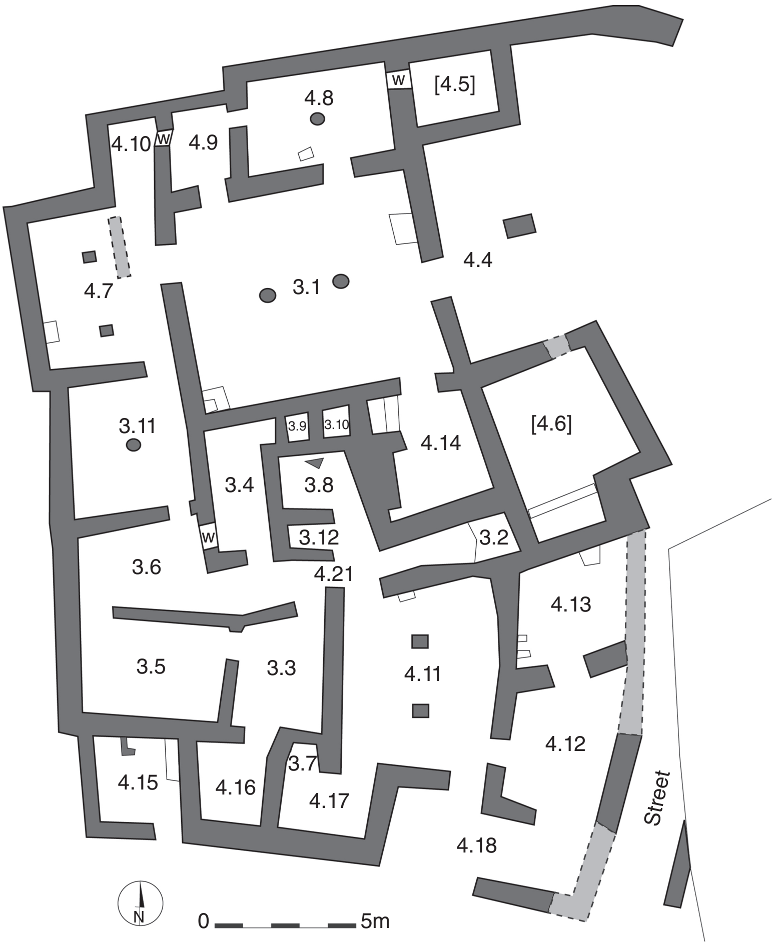

Fig. 5.1. Late Minoan IIIB Building Complex CD at Sissi (plan by Q. Letesson).

wings but that contact had to pass through the functional wing.[5] Hence differentiation, segmentation, and partitioning are evident as well as an apparent replication of a coherent set consisting of a hall with various service rooms around it within the same building. This could suggest the presence of several families within the same complex, a multi-family residence (Romanou 2007; Whitelaw 2001: 19), but, in the case of Building CD, there seems to be some evidence which, rather than a replication, suggests some kind of functional complementarity. Indeed, despite the general resemblance between the two halls, there are also some obvious differences: the column bases in 3.1 and the pillar bases in 4.11 are both axially placed but whereas the entrance to 3.1 is also axial, that of 4.11 is not. In contrast too is the presence of a large hearth between the pillars in hall 4.11 but the absence of a hearth from 3.1. Further differences concern the finds made: within hall 3.1 were found a deep bowl, a strainer, and a pithos as well as, against the east wall, a fixed installation with near to it two stone troughs (*gournes*) set in the floor, perhaps a press of some kind. In the centre of the hall were found two perforated stands of which the function is not clear. There was also a collection of unused stone tools within a stone box. In hall 4.11 were found a grinding stone, three cooking pots, a transport stirrup jar, three small stirrup jars, a *pyxis*, a goblet, a tubular stand, and an animal figurine. Moreover, the surrounding rooms of the two halls also comprise different types of assemblages: immediately north of Hall 3.1 was a kitchen (4.8) with a small hearth, a deposit of edible shells, and a grinding installation, a potential bathroom (4.9), reused as pantry with cups and pouring vessels, and storage rooms. Close to hall 4.11 was a shrine (3.8) (Gaignerot-Driessen 2014), a room with grinding stones (4.13),[6] one with different kinds of vases and lids (3.3), and a room which comprised a large collection of spool-shaped loom weights (3.6). This is a preliminary list since the full contexts are still under study but it seems already evident that, rather than replication, there is complementarity.

Before attempting an explanation, let us consider nearby Quartier Nu at Malia. Here, a large complex organized around a small court which carries the first pebble mosaic of the Mediterranean was excavated for the French School at Athens by A. Farnoux and the author between 1988 and 1993 (for detailed analyses and references, see Driessen et al. 2008; Driessen and Fiasse 2011) (Fig. 5.2). The entire compound is about 25 by 30 m large and extensively reuses earlier architectural features of the Middle and early Late Bronze Age (Devolder 2013; Schoep and Knappett 2003) but the fact that the structure was largely built as a single arrangement suggests at least some kinship connection between the occupants. Still, there are several entrances that give access to different spaces and a general organization in four wings could suggest the presence of different, discrete co-residing replicated units.

The pebble mosaic court on which were found some extraordinary objects including a very large house model may, however, have been shared by all inhabitants (Driessen and Farnoux 2011). An earlier space syntax analysis by Q. Letesson (Driessen et al. 2008: 97–9), clearly illustrates the potential existence of four ‘sectors’ relatively independent from each other. If we concentrate on the east wing, we also notice that here too larger spaces with internal supports formed the main rooms, poles of convergence—places for proximate social interaction—within each sector, and that the storage areas are globally in a segregated position by comparison with other spaces. But just as we saw in Building CD, there is one hall in Quartier Nu (X11) which is axially accessible and has a central column but no hearth, and one hall (X21–22) which has two columns and a hearth but is not axially accessible. Elsewhere we have presented detailed GIS analyses of the spatial distribution of objects in Quartier Nu (Driessen et al. 2008; Driessen and Fiasse 2011). What these distribution maps

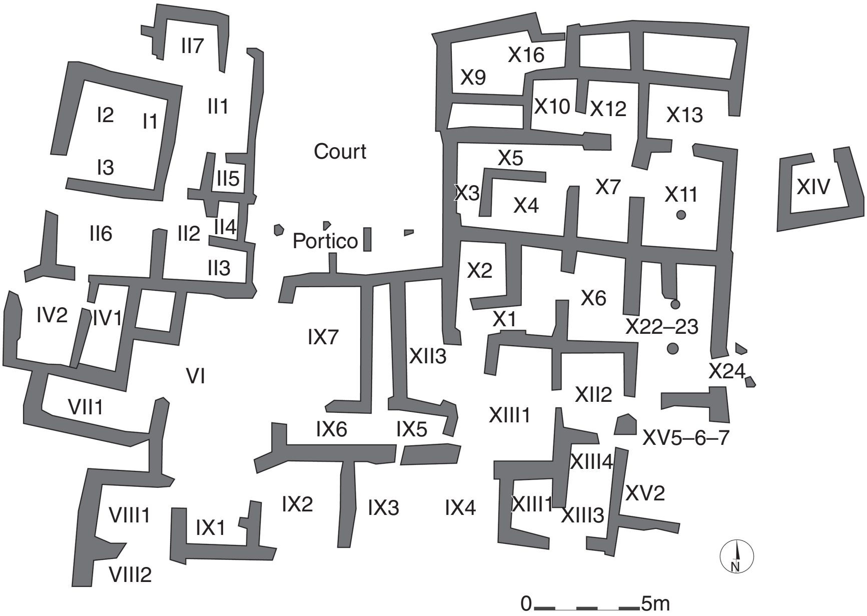

Fig. 5.2. Late Minoan IIIB Building Complex Nu at Malia (plan by Q. Letesson).

clearly underlined is that there was no straightforward repetition of archaeological material within the different assumed architectural units. Hence, the different analyses lead to contrasting results: a general architectural examination combined with configurational and visual analyses suggested the existence of distinctive units without, however, clearly excluding the possibility of some complementarity between the units, as suggested by an analysis of spatial configuration and the distribution of objects. Here it may suffice to note that loom weights and cooking pots as well as cult implements were primarily or exclusively located in the wing near hall X21–22 whereas hall X11 yielded an impressive stone vessel; opposite the main entrance into room X13, which serves as vestibule to hall X11, there was a separate kitchen (XIV). Small grinding stones, however, were found in both wings but a large grinding block was resting on the floor of room X13. In general then, Building CD at Sissi and Quartier Nu at Malia 'behave' quite similarly. This also means that the available archaeological evidence neither corresponds with that of a single extended household nor that of independent domestic units. An intermediate solution then is that both complexes were occupied by people who entertained close spatial and probably kinship relations strong enough to find an architectural translation within a single residential complex, next to or around a court, which may have been the real interaction zone and pole of convergence. The question remains, however, as to the type of relation which existed between the people?

Could it be that, as in later Greece, one of the halls was the private hall where the entire family converged whereas the other was the more public one where males entertained visitors and friends (Davidson 2011; Nevett 1995, 2010)? Both Sissi CD and Malia Nu are quite permeable structures, which implies that all the constitutive spaces were potentially easily accessible from the exterior; hence an interpretation that stresses only the public versus private character seems not in order (Driessen et al. 2008). Moreover, as mentioned already, the circulation pattern does not corroborate such a suggestion since both at Sissi and Malia the twin halls seem similarly accessible from outside, which may imply that both halls may also to some degree have served non-residents, perhaps even on a permanent basis. This could also imply that the social group dependent on the complexes was larger than the potential residing group. If we follow the 8 to 10 m^2 per person which both Schloen (2007) and Whitelaw (2001) have proposed, Building CD at Sissi, with its minimal size of 20 by 37.5 m or 750 m^2, could have housed between seventy-five and ninety-four people and the east wing in Quartier Nu, measuring 15 by 20 m or 300 m^2 could have housed between thirty and thirty-seven people. These numbers seem perhaps exaggerated but the large hall 3.1 at Sissi could easily have seated forty people, half of the potential residents of Building CD or a bit less if outsiders were involved.

Before offering a hypothesis that may take into account these observations, the potential occurrence of the twin-hall system elsewhere on the island during the Late Minoan III period may briefly be considered, as at Chania in Building 1 (Hallager and Hallager 2003: 186; 2011: 258), or perhaps also in Palaikastro, Building 4 (Hemingway, MacGillivray, and Sackett 2011: 524). The LM IIIB1 Building 1 (Fig. 5.3) at Chania covered an area of more than 150 m^2 with rooms E and D being quite similar although, again, only the first has a circular hearth.

LM IIIA2 Building 4 at Palaikastro likewise has a major large reception room (1) but the space beside it, Room 7, could have served as another hall (Fig. 5.4).

The clearest example occurs, however, during the following period, Late Minoan IIIC, at Vasiliki Kefala on the Hierapetra Isthmus (Fig. 5.5). At this last site especially, one axially accessible hall (6) has a central hearth between two column bases and is connected to the cult area to the south whereas the other hall (3) is not (Eliopoulos 1998). A doorway which originally led north was blocked at some stage whereas a door opened to the west into a storage room with pithoi, cooking pots, and cups. This replicated hall system does not, however, exist in all LM III sites since at Plati, Gournia, and Haghia Triada, for example, we encounter what may be called a megaroid-form plan whereas in other sites only small indistinctive rooms are found. Hence, the variety encountered must perhaps also imply that other in-house relationships existed than the one we try to identify at Sissi and Malia during LM III.

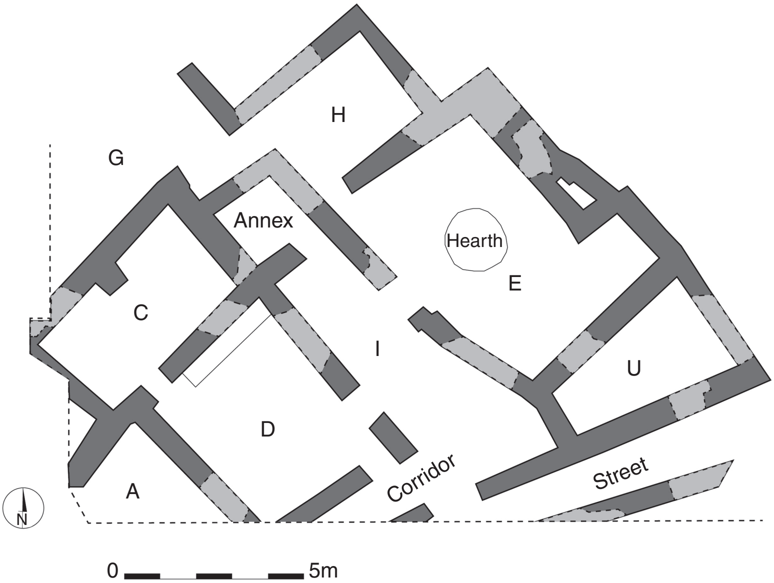

Fig. 5.3. Late Minoan IIIB1 Building 1 at Chania (plan by Q. Letesson).

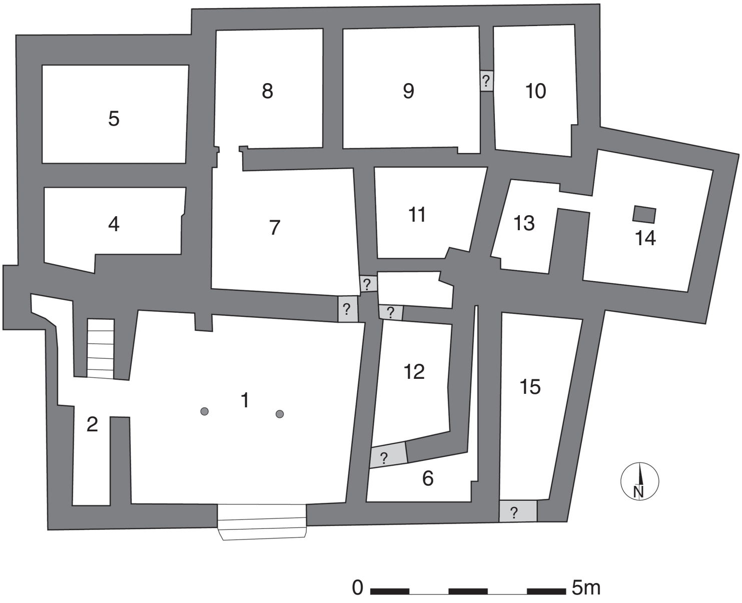

Fig. 5.4. Late Minoan IIIA2 Building 4 at Palaikastro (plan by Q. Letesson).

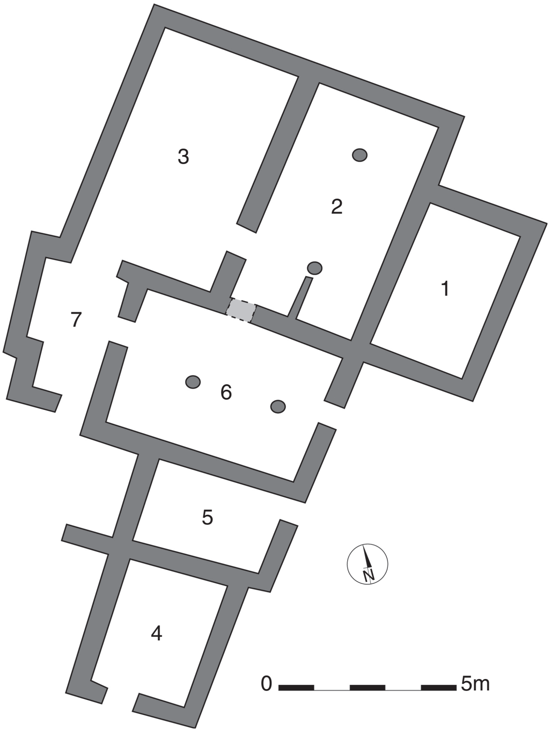

Fig. 5.5. Late Minoan IIIC Building Complex at Vasiliki Kefala (plan by Q. Letesson).

The late Susan Kent has suggested that increased partitioning of space should primarily be explained by an increased social complexity, resulting from gender or age distinctions or from increased social stratification or other types of specialization (Kent 1990; Letesson 2009: 362–9; Westgate 2015). Following this line of thought and taking into account some of the finds—especially cooking-pots and cooking-places and loom weights—we may hypothesize that a gender distinction lies at the basis of the spatial differentiation within Sissi CD and Malia Nu. Cooking and weaving are two practices that are usually branded as maintenance activities, the daily tasks related to the sustenance, well-being, and effective reproduction of all the members of a social group. As such these comprise care giving, feeding and food processing, weaving and cloth manufacture, hygiene, public health and healing, socialization of the children, and the fitting out and organization of related spaces (González-Marcén, Montón-Subias, and Picazo 2008: 3).[7] The material and symbolic structuring functions of these practices are essential for each society and it is accepted that in most traditional societies these tasks are performed by women.[8] Indeed, a survey of tasks in 185 traditional societies, using ethnoarchaeological sources, shows a biased gender-relatedness of some activities (Spain 1992: 83–5; Testart 2014: 148–51). Loom weaving, spinning, cooking, and preparation of vegetal foods are especially connected with women and have relatively good archaeological correlates. We should not a priori assume binary and exclusive models of gender roles and identities, however, since in some societies some of these tasks are also performed by men (Brumfiel and Robin 2008: 1–3). But if we *assume* a gender orientation for these tasks and notice their spatial concentration at Sissi and Malia, the possibility exists that the respective halls were specifically (if not exclusively) used by one gender. The axiality, size, and monumentality of hall 3.1 at Sissi together with the possibility that wine was produced and consumed within may then perhaps imply that it was the men's hall. The presence of a hearth, three tripod cooking pots and grinders in hall 4.11 at Sissi may then suggest that we are largely dealing with maintenance activities and especially cooking and food processing, activities usually associated with women. This could then imply that 4.11 was the women's hall. Interestingly, it is this hall which is closely connected to the shrine 3.8 and the loom(s) standing in room 3.6. The same reasoning would result for Quartier Nu in seeing hall X21–2 as the women's hall with hearth, cooking pots and an association with cult (in X2) and hall X11 as the men's hall where a fine stone goblet was found. This gender differentiation would then also imply a functional differentiation between the different wings and the presence of specifically male-oriented and specifically female oriented spaces within both Building CD and Quartier Nu. Before we consider its wider implications, let us briefly consider other evidence since Late Minoan III is, of course, the period for which we have independent textual evidence represented by the Knossian Linear B tablets as well as funerary data.

5.3. PEOPLING THE PAST?

The Mycenaean Linear B administration operating in and from the LM IIIA or fourteenth-century BCE palace at Knossos is only concerned with things that interest the system and hence we should not expect the tablets to give us a complete vision of contemporary society. Moreover, it not only gives a Knossos-centric but also a potentially Mycenaean as opposed to Minoan point of view, which is of course also opening possibilities for research. In her recently published study *Women in Mycenaean Greece* Barbara Olsen (2014) presents a thorough analysis of those women that do interest the bureaucrats of Pylos and Knossos—about 2000 at the latter site. She is categorical: the tablets reflect a patriarchal, gender-segregated society in which the inferior status of women is evident (Olsen 2014: 43). She states: 'labor is gender-segregated not only by clustering women and men into single-sex workgroups, but also by tasks and titles' (Olsen 2014: 61). In fact, only 5 occupational designations out of the 200 attested are carried by both sexes, the others all being gender-specific. These five are priests/priestesses, slaves of the god, slaves in general, stitchers, and weavers; but even then there are inequalities, with the male weaver being responsible for a workshop and the female weaver actually doing the job. Of these five, only the stitchers and weavers are our immediate concern since their production implies that they also form part of maintenance activities.[9] The Linear B tablets of Knossos add some other relevant information. Hence, women are often mentioned together with their children but for the rest only in textile-related contexts—and this involves more than a thousand women—whereas at Pylos, apart from textiles, they are also involved in food-processing and preparation, maintenance and attendant duties, and service (see Olsen 2014: 28–9 for a full list of occupations). Moreover, the Knossos administration introduces age groups as an additional way to distinguish between various women; hence categories such as adult women, girls, older girls, young women under instruction, and old women. But the inferior status of women and the gender segregation that are evident from the Knossos tablets do not find straightforward parallels in the funerary and iconographic record. This may of course be a result from our biased sample, with only high-class individuals that had the right to formal burial being preserved or forming the topic of official imagery being shown. Among the extant evidence, however, it seems that both men and women receive balanced attention; and some examples such as the princely burial of a woman in the Archanes Tholos A, the offerings associated with at least some of the women in the chamber tombs of Armeni, Mochlos, and Knossos, and even the possibility that the person buried in the Haghia Triada sarcophagus was a woman should warn us against taking the textual evidence simply at face value.[10]

5.4. EXCURSUS: GENDERED SPACES?

In the *Sex of Architecture*, a volume which deals with critical issues of gender within modern architecture, Ann Bergren (1996) asks how architecture would look if it were women who were responsible for its creation. She uses Aristophanes' Play, the *Ekklesiazusae*—the women who take over the assembly—to discuss how a rebellion by women against Classical architecture and the male-oriented society it represented would have ended. Badly apparently! Indeed, architecture, despite being called the 'Mother of Arts' by Frank Lloyd Wright, was and is still very much a male prerogative. The old English proverb 'man builds the house, the woman inhabits it' still haunts the discipline as much as the observation that 'men made the world and women made it liveable' (Betsky 1995: xiii). A cross-cultural examination of house building in more than 180 non-industrial societies showed that it was indeed mainly a male occupation, at least in those societies where its construction involved stone (Spain 1992: 84), but in many societies women are also involved in quarrying, brick-making, transport, and construction (see chapter 4). Still, many of the other gender-based dichotomies and assumptions—men's roles are public, women's private; women are wild and nature, men are refrained and culture—are at the base of a specific conception of society (modern or ancient) which excluded, controlled, or contained women. Alice Friedman (2006), on the other hand, in *Women and the Making of the Modern House*, explored to what extent Western (bourgeois) women clients influenced the design of a house they commissioned: she found that multiple functions replaced single-function rooms and spatial divisions were much less present. Sliding doors that allowed rooms to be enlarged were common. Moreover, boundaries were much more permeable and a greater stress was put on the education and activities of children—through an element of control—whereas private rooms were much less present or could be created for occasions (Friedman 1996; see also Betsky 1995: 152–75). For specialists of Minoan architecture, this may sound very familiar. The question of how far architecture commissioned for women would differ from that commissioned by men in traditional societies has been extensively explored in relation to Minangkabau society. The Minangkabau are a traditional ethnic group in Sumatra and one of the few that answers to modern definitions of matriarchy—a female-oriented society with sexes on equal footing—which is also matrilinear and matrilocal, as well as of being of Islamic faith (Reeves Sanday 2002).[11] In a paper entitled 'The Matrilineal Architectural values on the Construction of the Minangkabau House', Hardono and colleagues (2014) consider the houses for this aspect. For our purposes, it is interesting to note how both internally as well as externally the traditional Minangkabau houses pay plenty of attention to elaboration and decoration since the houses are considered as a symbol of the success and longevity of the residential group (Bahauddin et al. 2012; see also Hadler 2008: 36–40; Waterston 1990 for remarks on house building). Depending on the size of this group, the houses can be of considerable dimensions and although internal spaces are fluid because 'the house design is not just for personal use to shelter families but also a place for communal activities, a gathering space for comfort and peace. The breakdown of the interior space planning iterates the various functional spaces. However, all of these spaces function with no definite boundaries. Only the activities can determine the use of the spaces (i.e. cooking—kitchen, communal activities—main area). The invisible borders create an openness of the interior of the house thus making the internal part seem large and airy' (Bahauddin et al. 2012: 22). But at the same time, the internal organization answers to a firm in-house order which is related to the matrifocal organization of the Minangkabau (Ng 1993: 122). Within the houses a strict spatial and social hierarchy exists, with room occupation changing in a clockwise rotation around the central court according to the place a person occupies in the cycle of life. The house is the women's domain but the construction of a traditional Minangkabau house is commonly considered the responsibility of the 'in-born' men (*ninik mamak*), those born into the matrilineal descent group that owns and builds it (Vellinga 2004: 100). But both in-born and in-coming men, as well as all the women, first discuss the plan and elaboration. Sometimes, in-coming men will only invest in the parts they occupy with their wives, but in general friendly clans will also come and help, expecting reciprocity in the future, and all takes place under the supervision of an invited master builder (Hardono et al. 2014). The house plan of the Minangkabau has some resemblance to that of the Nair in India, likewise a matrifocal society where the men occupy the external spaces of the buildings (Driessen 2012b). Both the Minangkabau and Nair have the equivalent of men's houses, as do other matrifocal societies such as the Bemba of Zambia and the Palausians of Micronesia (Spain 1992: 67–79). On average, however, societies with men's houses are more stratified and have more gendered segregation and less women power. We may hence be on relatively stable ground in suggesting that the more a house shows a functional categorization and less integrated spaces, the higher its social differentiation may have been—which could imply gender differentiation and power asymmetries between men and women. The question is whether segregated spaces engender status differences? In other words, is women's status a result of this spatial in-house segregation? Daphne Spain (1992: xv) actually argues that spatial integration is a means to achieve higher status for women.

5.5. MINOAN GENDERS

If we return to the settlement evidence it is clear that a hypothesis on the gender-specific nature of the wings at Sissi and Malia has several implications. First of all, if we accept loom weights, grinding tools, and cooking pots as archaeological correlates of specifically female activities, a spatially organized gender-specific labour division seems to be implied. It would probably be a mistake to assume a too rigid segmentation but this would, to some extent, confirm the information on labour segregation between the sexes given by the Knossos Linear B tablets. And if the gender hypothesis is indeed at the basis of the spatial organization of Building CD and Quartier Nu, we are forced to accept a binary and rather rigid, exclusive sexual division and this because the hall systems at Sissi and Malia (but perhaps also elsewhere) only communicate in a very roundabout way. This seems to imply deliberate attempts at separation between the sexes at least in these larger residential complexes. Although the elaboration and monumentality of the halls which we have associated with men are clearly more impressive than those we have associated with women, status differences are not as boldly advertised by architecture as we would expect from the blatant power asymmetry suggested by the Knossos tablets. Rather a complementarity, even if slightly unbalanced, between the sexes seems to be the case. Whether this is a result of my erroneous reading of the architectural and archaeological context or because the reality was different than that represented by the Knossos administration needs more consideration. The almost immediate access to the presumed women's halls at Sissi and Malia does not suggest attempts to hide women in the more private sectors of the house as has been conjectured for some later Greek houses (Nevett 1995, 2010).

The patterns observed further suggest that women may have cooked in the area where they socialized, whereas men were brought the food from an outside or dependent area—room 4.8 at Sissi, the cooking shed XIV at Malia—probably continuing practices already evident in Late Minoan IB, as I will discuss in section 5.6. Moreover, at Sissi a kitchen (4.15) although spatially located close to what we have identified as the women's sector, is linked to the outside court, reflecting a third type of commensality and one which seems to have had a more public character. Commensality being at the heart of social relations in all non-industrial societies (Reeves Sanday 2002: 3), this seems to imply that gender-specific commensality practices were held as well as more public gender-inclusive events and that gender-exclusive meals, as seems the case in Archaic Greece were a later development (Haggis et al. 2007). Again this seems to suggest complementarity rather than an unbalanced relationship. Cooking and eating seem then to have taken place in different contexts and at various levels, from the most private to the most public, and many non-industrial societies, such as the matrifocal Minangkabau (mentioned above), can be used as a parallel.[12] Those who prepare the meals and those who participate are often subjected to a strict hierarchy and rules.[13] Merging the cooking with the dining area and living room achieved an informal mingling of functions and house members which may have placed women in a controlling position at the heart of social activity and hence at the focus of the house's geography—which was, incidentally, what Frank Lloyd Wright also did with many of his houses (Betsky 1995: 152; Friedman 2006: 219).

There are two other features which need to be stressed: the hearth and the shrine. If the gender hypothesis stands a chance of being correct, both hearths and shrines have an intimate connection to the women's wing. Men's wings have no immediate connection with cult, nor do they have hearths, and it is especially this last observation which may be a bit difficult to swallow in view of the importance of central hearths in Mycenaean palaces where they are assumed to have a specifically male association (cf. Dörpfeld's 'Männerwohnung') (see Maran 2009 for a brief overview; Maran and Stavrianopoulou

2007). Performing 'a key role in social reproduction, central hearths might have played also a decisive function in terms of spatial solidarity', the 'locus where kinship is created through cooking and eating practices' (Letesson 2015: 731); this seems to underline the role of women in these practices, at least in Late Minoan III. Since the number of Neopalatial fixed hearths known is still quite small (as opposed to their common appearance in Protopalatial Malia for example), I feel less confident giving them so much importance already in the Neopalatial period, especially since portable hearths—even if perhaps specifically or exclusively used in rooms with central pillars—gave a flexibility to internal arrangements.[14] It may then be no surprise that near the male hall at Sissi we found a portable hearth, in room 4.10 (Driessen et al. 2011: 119–20).[15] Finally, and perhaps most interestingly, is that the shrines in the complexes of Sissi, Malia, and Vasiliki Kefala are all closely associated with women's quarters, to such an extent that we may perhaps add them as an in-house maintenance activity (Gaignerot-Driessen 2014). This is a rather intriguing suggestion which needs more backing; but it may be revealing that most evidence for earlier domestic cult comes from upper floors, where one would also have looked for apartments occupied by women.[16] This could then also suggest that the ceremonial function of the residence was foremost linked to female performances and rituals (Driessen 2012a). Finally, we may wonder whether the double-megaron system—identified in the palace of Tiryns but which may also be present, in some different form, in the palace of Pylos and the main buildings at Gla and Dimini—bears some relationship with the double hall system as identified on Late Minoan III Crete.

5.6. GOING BACK IN TIME?

The question is: do this twin-hall system and a potential in-house gender segregation represent a new feature from Late Minoan IB onwards or is it the continuation of something which already existed in Minoan residential architecture? The Minoan habit since late Prepalatial times of constructing upwards rather than sidewards, and hence placing a variety of functions on the upper floor, prevents us from fully appreciating Minoan homes from a comparative point of view. Already in Late Minoan IB, however, some houses which did not carry an upper floor gradually become the norm. The best example is probably House B in the Artisans' Quarter at Mochlos, a sizeable final (i.e. very late) Late Minoan IB construction which has a complex plan including two larger rooms with a central pillar (Fig. 5.6). These two are quite similar in access and disposition, and it is this building which was at the basis of the outdoor kitchen hypothesis which Brogan and Barnard have identified at Late

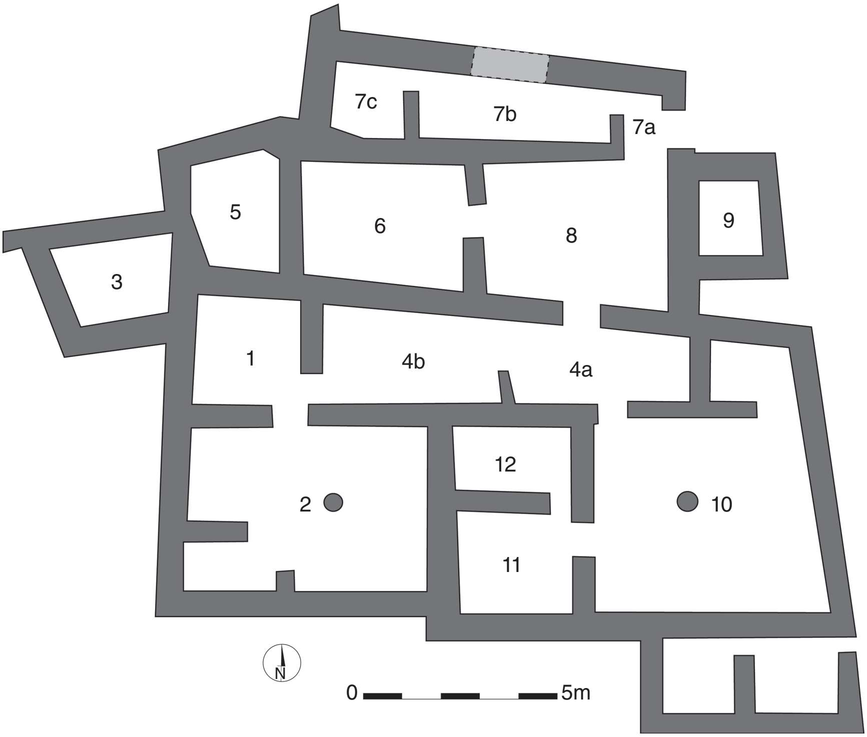

Fig. 5.6. Late Minoan IB Artisans' Quarter at Mochlos, House B (plan by Q. Letesson).

Minoan IB Mochlos and which announces a postpalatial habit (Brogan and Barnard 2011).[17]

Hence, the replicated hall system together with the external kitchens may suggest that differentiated gender-related practices were already introduced before the final Late Minoan IB destructions. Other examples may be found at Malia, Sissi, and Palaikastro. The house at Hagia Varvara near Malia (Fig. 5.7) is likewise dated to Late Minoan IB: Pelon (1966) has suggested that rooms 2–4 originally formed a single room with a wooden floor supported by smaller walls. These two rooms produced several loom weights and perhaps also an installation for a loom (if this is how we should interpret the sandstone block with cavities). Hence here too gender-specific rooms, located next to each other, may have existed.

Again at Sissi, there is a single residential block formed by the three Neopalatial buildings BA–BC–BD, each with its separate entrance but each perhaps also with more than one hall with a central column, cooking installations, and loom weights. Perhaps here too a gender division was already operational. The main question is of course to what extent our somewhat earlier 'polite' Neopalatial architectural evidence allows the recognition of a

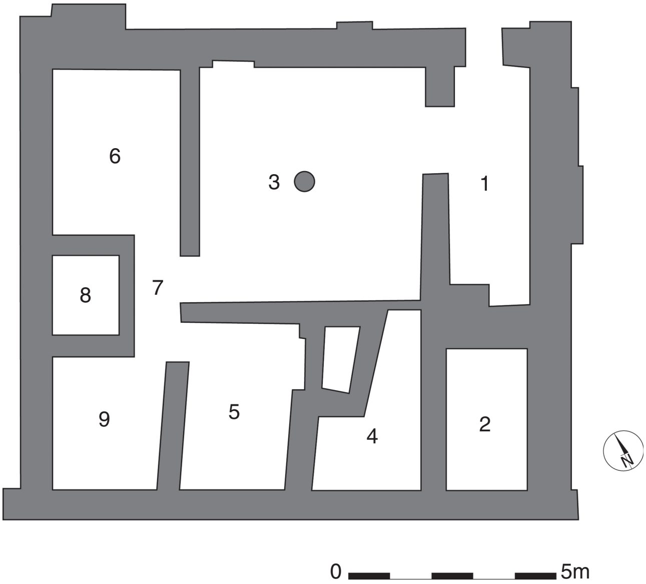

Fig. 5.7. Late Minoan I House at Hagia Varvara, Malia (plan by Q. Letesson).

similar division. In comparison with Late Minoan III architecture, there is clearly a greater categorization and segregation in Neopalatial residential buildings, and the existence of different and more elaborate interior designs suggests various ways of social structuring (Letesson 2009). But rather than being symptomatic of a rigid categorization between the different residences or Houses which could be used indirectly to reconstruct some kind of class system along the lines suggested by John McEnroe (1982), the elaboration seems to be primarily directed inwards and indeed hides a process towards greater differentiation between the in-house members. In other words, within each settlement, similarities in house size, construction, external appearance, elaboration, and decoration are unmistakable, giving the settlement a great homogeneity.[18] This applies to more rustic settlements like Gournia and Pseira as well as to more palatial ones as Knossos, Palaikastro, or Malia. Somehow this seems to advertise an ideology which adhered to a message of broad and relative egalitarianism between the houses and Houses. But the increasing internal differentiation suggests greater distinctions within the respective groups, not between the groups. The unavoidable question then is whether this increased internal differentiation hides a potential gender differentiation or some other type of distinction (such as age or affiliation). The suggestion is of course not new, and one of the founding fathers of Minoan architectural studies, J. W. Graham (1959), had already followed up Evans's lead in the suggestion that Minoan palaces and large residences had both men and women's halls. I have also explored this possibility taking the Lustral Basin as a female initiation area and hence related rooms (and especially Minoan Halls) as specifically used by women for gender-specific rituals; areas identified as banqueting halls which are always located in more easily accessible places of the houses or palaces and never associated with Lustral Basins or Minoan Halls, I suggested could have been more related to male practices (Driessen 2012b, 2015). But whereas this potential gender-division in Minoan residences seems to be specifically related to semi-public rituals and practices, it cannot (yet) be shown to be operating in the more private sphere of more simple residences where the central pillar room seems to be the pole of convergence for the entire family (Letesson 2015). Moreover, the relative scarcity of evident cooking places within the realm of the residence could imply that cooking was very much a social activity done outside, in common. The practice of adding cooking sheds to the outer core of the dwelling (connected to the outside rather than hidden away within the building), which is especially evident at Late Minoan I Mochlos but also at Palaikastro in Building IV (room 14 on Fig. 5.4), may also suggest that those who were doing the cooking were not hidden from view.[19] The question is then of course whether the Late Minoan III system, with a seemingly more advertised gender separation in all spheres, developed out of an earlier system where only semi-public practices were conducted separately.

5.7. CONCLUSION

Following Max Weber, it is usually assumed that spatial segregation between the sexes implies unequal status and gender stratification (Adams 2005), and anthropological studies seem to confirm that, taken comprehensively, the more male and female quarters are segregated the lower the status of women usually is (Spain 1992: 61–3).[20] However, quite a few societies with segregated spatial arrangements do show relatively high status for women, including the Navajo and Minangkabau (both matrifocal societies) and the Atoni of Timor. Women's status in these societies is often a result of their control of labour, control of property, and degree of participation in public life (Spain 1992: 33). Much of this is of course cultural, but in these societies the complementarity of the sexes, and their duality rather than the domination of one by the other, is seen as essential (Spain 1992: 58). The archaeological evidence of some Late Minoan III residences suggests a spatially segregated but complementary gender system in which the tasks, dealings, and cult practices of men and women were seemingly relatively balanced. Men and women seem to some extent to have led separate lives and activities, both socially appreciated and matching. Perhaps this allows us to reinterpret some of the findings of the Linear B tablets of Knossos. Olsen (2014: 260) in fact observed some major differences between Pylos and Knossos stating that 'Minoan women laboured in corvée workgroups, maintained property in their own names, and, most importantly, owned land', a situation which she regards as a holdover from the Neopalatial period and much better than the fate shared by their Mycenaean mainland sisters. If twin halls and some kind of gender segregation/complementarity are characteristic only for larger residences both during Neopalatial and Postpalatial times—the real Houses with which this paper started—then we may finish with the observation that in smaller residences men and women did not seem to have led segregated lives and that the scale of the houses and their elaboration may after all reflect something more important than I initially assumed. If some small and internally simple houses should indeed be interpreted as residences for nuclear families, the others by implication are not. This may then suggest different social dynamics and systems co-existing within the various settlements. It also warns us not to generalize conclusions but to take into account the possible existence of different temporal and geographical trajectories.

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NOTES

1. Hence the telling title *The Prehistory of Home* (Moore 2012).
2. Knappett (2009) was mainly interested in this scalar relationship, not the internal organization of the household. Each level in the hierarchy would have been organized along the same principles of household relationships, until ultimately the state as a whole can be conceptualized as a grand household of households, headed by a patriarchal figure. Knappett used the idea of replication to suggest that Minoan society was basically the same: a scaling up of households into a state with a fractal, scale invariant pattern.
3. For a good historical appreciation, see Fox 1993. Driessen 2010: 51 gives the size of intermediate Minoan structures and I have Whitelaw's own data (esp. Whitelaw 2001: fig. 2.4) to suggest the existence of another type of social unit: of the 207 houses used in his analysis, only 80 have a ground surface of less than 100 m^2, 88 between 100 and 200 m^2, and 39 more than 200 m^2 including a few very sizeable ones on which my analysis was based.

4. See also houses as 'embodied things' and houses as 'built things' (Hodder and Pels 2010: 181).
5. There is, however, a small gap in the south-west corner of room 4.14, giving out to space 3.2 which seems to be a working space provided with stone tools and mortars. The gap is too small to let a person through (apart from a small child) but could have served to pass objects or meals from one wing to another.
6. C. Tsoraki (pers. com 17.12.14): 'Although grinding tools (grinders and querns) occur almost in all rooms in Building CD, they tend to occur more frequently in the rooms around hall 4.11.The largest concentration of grinding tools in Building CD occurs in room 4.15 (n=6) and room 3.5 (n=5), while hall 4.11 itself gave another four grinding tools. Overall, there is variation in the spatial distribution of ground stone artefacts between the northern part of the building (hall 3.1 and rooms to the north) and the southern part of Building CD'.
7. Maintenance activities are those activities that are assumed to 'reproduce' the household which is why the preparation of food and clothing are commonly considered to have been associated with women. Using the objects associated with these functions—mill stones, cooking pots, hearths, and loom weights—as indicators to identify female spaces in Minoan residential architecture reveals an interesting picture of functional organization.
8. The concentration and intensification of objects related to these tasks, however, is often seen as suggestive of elite exploitation of these activities and their use within social strategies and a form of control, similar to that shown by attached specialists and artisans.
9. The burial of a male involved in textile production (spinner?) dating to the Orientalizing period was actually identified at Meseleroi in East Crete (Vogeikoff-Brogan and Kirkpatrick Smith 2010). I thank F. Gaignerot for this reference.
10. For a general discussion on the role of women during LM III (Alberti and Borgna 2012); for the possibility that a woman was buried in the Haghia Triada sarcophagus (Privitera forthcoming).
11. 'The concept of matriarchy is relevant in societies where maternal symbols are linked to social practices influencing the lives of both sexes and where women play a central role in these practices' (Reeves Sanday 2002: xii).
12. Ng 1993: 128: 'When ostentatious cooking is done, as for the large ceremonial feasts, a simple shack is erected to serve as the cooking space in the compound, partly because more space is needed and partly to be in public view': this in contrast to daily cooking and eating which is a private matter.
13. Apart from age categories that introduce hierarchy, wife- or husband-giving groups are usually considered more important for the reproduction of the house than wife- or husband-taking groups who do little for the house itself.
14. See Letesson 2015: 741–3 on portable Neopalatial hearths. Although simple town houses usually have a single main ground floor room with central pillar (Michaelidou 1987), many of the large residences on Neopalatial Crete have in fact more than one large room and multiple large halls, even on ground level, which could conceivably imply that the replication that exists in LM III goes back to an earlier social system. It does not exist in every building, however; although

again the presence of an upper floor prevents us from being sure. In some cases, however, one of the halls seems to be more difficult to access and hence more private, hence more in line with the Classical Greek evidence.

15. The portable hearth is labelled 'lekane' in the preliminary publication. See also Hemingway, MacGillivray, and Sackett 2011: 526, fig. 10a for a fragmentary similar hearth from a LM IB kitchen in Building 4 at Palaikastro.
16. Compare with Celik 1996: 130. In traditional North African towns too, the female space is upstairs and especially on the rooftops, where the women can easily communicate with their neighbours, whereas the male space is the crowded streets. Women ruling in-house rituals within large residences is a feature common to many matrifocal societies as those of the Minangkabau and Nair mentioned in section 5.4. At Myrtos Pyrgos but also in several houses at Knossos, Malia, and Palaikastro, for example, most of the ritual paraphernalia were found fallen from upstairs, but in many of these houses prime importance was given to staircases to reach these apartments, often almost immediately from the outside door (Driessen 2005).
17. See also Hemingway, MacGillivray, and Sackett 2011: 524–7 for a similar kitchen at LM IB Palaikastro (Building 4).
18. Even if one gets the impression that a lesser investment in architecture is matched by a greater investment in portable finds and symbolic elaboration (and vice versa).
19. Brogan and Barnard 2011: 197: 'The exposed location of the kitchen (with access typically from a separate exterior entrance) does not follow a pattern of gendered space that stresses the privacy of female members of the household'.
20. In her comparative presentation of ninety-three non-industrial societies in which 22 per cent showed dwelling segregation (i.e. separate male and female quarters), she suggests that, although women's power in kinship networks was greatest in societies without dwelling segregation, especially in relation to inheritance, women's control of labour and property was greatest in those that did show dwelling segregation.

REFERENCES

Adams, J. 2005. 'The Rule of the Father: Patriarchy and Patrimonialism in Early Modern Europe'. In *Max Weber's Economy and Society: A Critical Companion*, edited by C. Camic, P. S. Gorski, and D. M. Trubek. Stanford, CA: Stanford University Press: 237–66.

Alberti, M. E. and E. Borgna. 2012. 'Le donne nella civiltà micenea'. *Forma Urbis* 17.3: 27–32.

Bahauddin, A., S. Hardono, A. Abdullah, and N. Z. Maliki. 2012. 'The Minangkabau House: Architectural and Cultural Elements'. *Eco-Architecture* 4: 15–24.

Bergren, A. 1996. 'Female Fetish Urban Form'. In *The Sex of Architecture*, edited by D. Agrest, P. Conway, and L. Kanes Weisman. New York: Harry N. Abrams, Inc.: 77–96.

Betsky, A. 1995. *Building Sex. Men, Women, Architecture, and the Construction of Identity*. New York: William Morrow.

Bloch, M. 2010. 'Is There Religion at Catalhöyük…or are There just Houses?' In *Religion in the Emergence of Civilization. Catalhöyük as a Case Study*, edited by I. Hodder. Cambridge: Cambridge University Press: 146–62.

Brogan, T. M. and K. A. Barnard. 2011. 'Household Archaeology at Mochlos: Statistical Recipes from the Late Minoan I Kitchen'. In *Στέγα: The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 185–98.

Brumfiel, E. M. and C. Robin. 2008. 'Gender, Households, and Society: An Introduction'. In *Gender, Households, and Society: Unravelling the Threads of the Past and the Present*, edited by C. Robin and E. M. Brumfiel. Oxford: Wiley-Blackwell: 1–16.

Celik, Z. 1996. 'Gendered Spaces in Colonial Algiers'. In *The Sex of Architecture*, edited by D. Agrest, P. Conway, and L. Kanes Weisman. New York: Harry N. Abrams, Inc.: 127–40.

Davidson, J. 2011. 'Bodymaps: Sexing Space and Zoning Gender in Ancient Athens'. *Gender and History* 23.3: 597–614.

Devolder, M. 2013. 'Le Quartier Nu (Malia, Crète): L'occupation néopalatiale'. *Bulletin de Correspondance Hellénique* 136–7.1: 1–82.

Driessen, J. 2005. 'On the Use of the Upper Floors in Minoan Neopalatial Architecture'. In *Kris Technitis. L'Artisan Crétois: Recueil d'articles en l'honneur de Jean-Claude Poursat* (Aegaeum 26), edited by I. Bradfer-Burdet, B. Detournay, and R. Laffineur. Liège: Université de Liège: 83–8.

Driessen, J. 2010. 'Spirit of Place: Minoan Houses as Major Actors'. In *Political Economies of the Aegean Bronze Age*, edited by D. J. Pullen. Oxford: Oxbow Books: 35–65.

Driessen, J. 2012a. 'A Matrilocal House Society in Pre- and Protopalatial Crete?'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, P. D. Tomkins, and J. Driessen. Oxford: Oxbow Books: 358–83.

Driessen, J. 2012b. 'Chercher la femme: Identifying Minoan Gender Relations in the Built Environment'. In *Minoan Realities: Approaches to Image, Architecture, and Society in the Aegean Bronze Age* (Aegis 5), edited by D. Panagiotopoulos and U. Günkel-Maschek. Louvain-la-Neuve: Presses universitaires de Louvain: 54–63.

Driessen, J. 2015. 'For an Archaeology of Minoan Society: Identifying the Principles of Social Structure'. In *Minoan Archaeology: Perspectives for the 21st Century* (Aegis 8), edited by S. Cappel, U. Günkel-Maschek, and D. Panagiotopoulos. Louvain-la-Neuve: Presses universitaires de Louvain: 149–66.

Driessen, J. and A. Farnoux. 2011. 'A House Model from Malia'. In *Κρήτης Μινωιδός: Tradizione e identità Minoica tra Producione Artigianale, Pratiche Cerimoniali e Memoria del Passato. Studi offerti a Vincenzo La Rosa per il suo 70° compleanno*, edited by F. Carinci. Padua: Centro di Archeologia Cretese, Bottega d'Erasmo: 299–311.

Driessen, J. and H. Fiasse. 2011. 'Burning Down the House: Defining the Household of Quartier Nu at Malia Using GIS'. In *Στέγα: The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 285–96.

Driessen, J., H. Fiasse, M. Devolder, P. Hacigüzeller, and Q. Letesson. 2008. 'Recherches spatiales au Quartier Nu à Malia (MR III)'. *Creta Antica* 9: 93–110.

Driessen, J., I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, H. Fiasse, P. Hacigüzeller, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. 2009. *Excavations at Sissi: Preliminary Report on the 2007–2008 Campaigns* (Aegis 1). Louvain-la-Neuve: Presses universitaires de Louvain.

Driessen, J., I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. 2011. *Excavations at Sissi, II. Preliminary Report on the 2009–2010 Campaigns* (Aegis 4). Louvain-la-Neuve: Presses universitaires de Louvain.

Driessen, J., I. Schoep, M. Anastasiadou, F. Carpentier, I. Crevecoeur, S. Déderix, M. Devolder, F. Gaignerot-Driessen, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, F. Liard, A. Schmitt, C. Tsoraki, and R. Veropoulidou. 2013. *Excavations at Sissi III. Preliminary Report on the 2011 Campaign* (Aegis 6), Louvain-la-Neuve: Presses universitaires de Louvain.

Eliopoulos T. 1998. 'A Preliminary Report on the Discovery of a Temple Complex of the Dark Ages at Kephala Vasilikis'. In *Eastern Mediterranean: Cyprus-Dodecanese-Crete, 16th–6th cent. B.C.*, edited by A. Karetsou, N. C. Stampolides, and A. Kanta. Heraklion: University of Crete: 301–13.

Ensor, B. E. 2013. *The Archaeology of Kinship: Advancing Interpretation and Contributions to Theory*. Tucson, AZ: University of Arizona Press.

Fox, J. J. 1993. 'Comparative Perspectives on Austronesian Houses: An Introductory Essay'. In *Inside Austronesian Houses: Perspectives on Domestic Designs for Living*, edited by J. J. Fox. Canberra: Australian National University Press: 1–29.

Friedman, A. T. 1996. 'Not a Muse: The Client's Role at the Rietveld Schröder House'. In *The Sex of Architecture*, edited by D. Agrest, P. Conway, and L. Kanes Weisman. New York: Harry N. Abrams: 217–32.

Friedman, A. T. 2006. *Women and the Making of the Modern House: A Social and Architectural History*. New Haven, CT: Yale University Press.

Gaignerot-Driessen, F. 2014. 'Goddesses Refusing to Appear? Reconsidering the Late Minoan III Figures with Upraised Arms'. *American Journal of Archaeology* 118.3: 495–507.

González-Marcén, P., S. Montón-Subias, and M. Picazo. 2008. 'Towards an Archaeology of Maintenance Activities'. In *Engendering Social Dynamics: The Archaeology of Maintenance Activities*, edited by S. Montón-Subias and M. Sánchez-Romero. Oxford: Archaeopress: 3–8.

Graham, J.W. 1959. 'The Residential Quarter of the Minoan Palace'. *American Journal of Archaeology* 63: 47–52.

Hadler, J. 2008. *Muslims and Matriarchs: Cultural Resilience in Indonesia through Jihad and Colonialism*. Ithaca, NY: Cornell University Press.

Haggis, D. C., M. S. Mook, C. M. Scarry, L. M. Snyder, R. D. Fitzsimons, E. Stephanakis, and W. C. West. 2007. 'Excavations at Azoria, 2003–2004, Part 1, The Archaic Civic Complex'. *Hesperia* 76: 243–321.

Hallager, E. and B. P. Hallager. 2003. *The Greek-Swedish Excavations at the Agia Aikaterini Square Kastelli, Khania 1970–1987 and 2001. III:1 The Late Minoan IIIB:2 Settlement*. Stockholm: Paul Aströms Förlag.

Hallager, E. and B. P. Hallager. 2011. *The Greek-Swedish Excavations at the Agia Aikaterini Square Kastelli, Khania 1970–1987 and 2001. IV:1 The Late Minoan IIIB:1 and IIIA:2 Settlements*. Stockholm: Narayana Press.

Hardono, S., A. Bahauddin, A. Abdullah, and N. Z. Maliki. 2014. 'The Matrilineal Architectural Values on the Construction of the Minangkabau House'. *DIMENSI—Journal of Architecture and Built Environment* 41:1: 51–8.

Hemingway, S., J. A. MacGillivray, and L. H. Sackett. 2011. 'The LM IB Renaissance at Postdiluvian Pre-Mycenaean Palaikastro'. In *LM IB Pottery: Relative Chronology and Regional Differences*, edited by T. M. Brogan and E. Hallager. Athens: Danish Institute at Athens: 513–30.

Hodder, I. and P. Pels. 2010. 'History Houses'. In *Religion in the Emergence of Civilization*, edited by I. Hodder. Cambridge: Cambridge University Press: 163–86.

Jusseret, S., J. Driessen, and Q. Letesson. 2013. 'Minoan Lands? Some Remarks on Land Ownership on Bronze Age Crete'. In *An Archaeology of Land Ownership*, edited by M. Relaki and D. Catapoti. New York: Routledge: 46–69.

Kent, S. 1990. *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study*. Cambridge: Cambridge University Press.

Knappett, C. 2009. 'Scaling Up: From Household to State in Bronze Age Crete'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 14–26.

Letesson, Q. 2009. *Du phénotype au génotype: Analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Letesson, Q. 2015. 'Fire and the Holes: an Investigation of Low-Level Meanings in the Minoan Built Environment'. *Journal of Archaeological Method and Theory* 22: 713–50.

Maran, J. 2009. 'Mycenaean Citadels as Performative Space'. In *Constructing Power. Architecture, Ideology and Social Practice*, edited by J. Maran, C. Juwig, H. Schwengel, and Ulrich Thaler. Berlin: LIT Verlag: 75–91.

Maran, J. and E. Stavrianopoulou. 2007. '*Πότνιος Ἀνήρ*—Reflections on the Ideology of Mycenaean Kingship'. In *KEIMELION: The Formation of Elites and Elitist Lifestyles from Mycenaean Palatial Times to the Homeric Period*, edited by E. Alram and G. Nightingale. Vienna: Verlag der Österreichischen Akademie der Wissenschaften: 285–98.

McEnroe, J. 1982. 'A Typology of Minoan Neopalatial Houses'. *American Journal of Archaeology* 86.1: 3–19.

Michaelidou, A. 1987. '*Το δωμάτιο μϵ τον κίονα στο μινωικό σπίτι*'. In *ΑΜΗΤΟΣ, ΤΙΜΗΤΙΚΟΣ ΤΟΜΟΣ ΓΙΑ ΤΟΝ ΚΑΘΗΓΗΤΗ ΜΑΝΟΛΗ ΑΝΔΡΟΝΙΚΟ*, Thessaloniki: Aristotelio Panepistemio: 509–26.

Moore, J. D. 2012. *The Prehistory of Home*. Berkeley, CA: University of California Press.

Nevett, L. 1995. 'Gender Relations in the Classical Greek Household'. *Annual of the British School at Athens* 90: 363–81.

Nevett, L. 2010. *Domestic Space in Classical Antiquity*. Cambridge: Cambridge University Press.

Ng, C. 1993. 'Raising the House Post and Feeding the Husband-Givers: The Spatial Categories of Social Reproduction among the Minangkabau'. In *Inside Austronesian Houses: Perspectives on Domestic Designs for Living*, edited by J. J. Fox. Canberra: Australian National University Press 121–44.

Olsen, B. A. 2014. *Women in Mycenaean Greece: The Linear B tablets from Pylos and Knossos.* London: Routledge.

Pelon, O. 1966. 'Maison d'Hagia Varvara et architecture domestique à Mallia'. *Bulletin de Correspondance Hellénique* 90.2: 552–85.

Platon, L. 2011. 'Studying the Character of the Minoan "Household" within the Limits of the Neopalatial Settlement of Zakros'. In *Στέγα: The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 151–61.

Privitera, S. Forthcoming. 'The Tomb, the House, and the Double Axes: Late Minoan IIIA2 Hagia Triada as a Ritual and "Mythical" Place'. *METAPHYSIS: Ritual, Myth and Symbolism in the Aegean Bronze Age*, edited by E. Alram-Stern, F. Blakolmer, S. Deger-Jalkotzy, R. Laffineur, and J. Weilhartner. Leuven: Peeters.

Reeves Sanday, P. 2002. *Women at the Center: Life in a Modern Matriarchy*. Ithaca, NY: Cornell University Press.

Romanou, D. 2007. 'Residence Design and Variation in Residential Group Structure: A Case Study, Mallia'. In *Building Communities: House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fisher, and J. Whitley. London: British School at Athens: 77–90.

Schoep, I. and C. Knappett. 2003. 'Le Quartier Nu (Malia, Crète): L'occupation de Minoen Moyen II'. *Bulletin de Correspondance Hellénique* 127: 49–86.

Schloen, D. 2007. *The House of the Father as Fact and Symbol: Patrimonialism in Ugarit and the Ancient Near East.* Winona Lake, IN: Eisenbrauns.

Spain, D. 1992. *Gendered Spaces*. Chapel Hill, NC: University of North Carolina Press.

Testart, A. 2014. *L'amazone et la cuisinière: Anthropologie de la division sexuelle du travail.* Paris: Gallimard.

Vellinga, M. 2004. 'A Family Affair: The Construction of Vernacular Minangkabau Houses'. *Indonesia and the Malay World* 32.92: 100–18.

Vogeikoff-Brogan, N. and S. Kirkpatrick Smith 2010. 'A Male Spinner? A Late Geometric–Early Orientalizing Pithos Burial near Meseleroi, Ierapetra'. *Aegean Archaeology* 10: 87–104.

Waterston, R. 1990. *The Living House: An Anthropology of Architecture in South-East Asia*. New York: Whitney Library of Design.

Westgate, R. 2015. 'Space and Social Complexity in Greece from the Early Iron Age to the Classical Period'. *Hesperia* 84.1: 47–95.

Whitelaw, T. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age,* edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Whitelaw, T. 2007. 'House, Households and Community at Early Minoan Fournou Korifi: Methods and Models for Interpretation'. In *Building Communities: House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fisher, and J. Whitley. London: British School at Athens: 65–76.

Part II

6

Urbanism

Built Space and Communities at the Meso-Scale

Quentin Letesson and Carl Knappett

Agglomerations of buildings, whether just a handful in a loose settlement, or a whole town with elaborate urban infrastructures (street system, drainage, open spaces, and other 'public works') constitute the meso-scale, the level of the community.

Remarks on the variable quality of our data sets (see chapter 2) clearly apply to what we know of the meso-scale. Unfortunately, additional parameters also limit our understanding of Minoan agglomerations, constrain interpretation and, at worst, undermine the applicability of some analytical methods. First, we are confronted with the urban palimpsest phenomenon: many settlements were occupied during very long periods of time and witnessed multiple construction phases, often very difficult to differentiate in the archaeological record. When they are not reused as foundations for later buildings, early structures are sometimes dismantled and their building materials recovered for new projects; paved streets can be maintained for centuries (Cunningham 2007; Gomrée 2013), whereas in other instances they disappear under new building programmes (Devolder et al. forthcoming; Platon 1990; see also chapter 9); and the longer and denser the occupation, the more building phases are jumbled together in intricate layouts. Of course, this tendency is not limited to Minoan times: large parts of sites like Chania and Archanes are still buried under modern towns. Although making sense of this urban palimpsest is certainly not beyond the reach of archaeologists, other factors also hinder approaches to Minoan agglomerations. In recent years, for obvious reasons, excavations have been unable to match the scope of early twentieth-century projects. Nowadays, towns like Gournia and Palaikastro could not be as extensively and rapidly excavated. This, of course, has clear positive implications but also means that, in many cases, we only have a glimpse of the overall area of settlements.

Nevertheless, the same limitations often prompt very productive approaches. Remains produced by old excavations can be thoroughly reconsidered; for example, through a combination of archival work, field observations, and topographical measures, Buell and McEnroe (see chapter 9) have been able to provide an updated and refined version of Boyd's original town plan of Gournia; and the relentless efforts of members of the Italian School at Athens to publish early excavations continue to improve our understanding of important sites such as Phaistos and Haghia Triada.[1] Furthermore, new parts of existing major settlements are also explored, albeit on a lesser scale than the projects that originally unearthed these urban centres—such as in Gournia, but also in Palaikastro and Knossos.[2] In relatively recent years, work in smaller agglomerations was also resumed and resulted in final publications of very high quality such as in Pseira (e.g. McEnroe 2001) or Mochlos (e.g. Soles 2003); other second-order agglomerations, like Kommos, were discovered, extensively excavated, and almost entirely published (e.g. Shaw and Shaw 1996, 2006, and 2012; see also chapter 10). Although some might argue that the geophysical prospection of Minoan sites has been rather inconclusive, not to say deceptive, non-intrusive survey techniques are also more regularly used and, with the expertise of research centres specialized in remote sensing and spatial analyses such as at the IMS-FORTH at Rethymno,[3] there seems to be a very promising future for such techniques. A number of new projects also feature an important environmental component: archaeobotanical studies, geomorphological sampling, and micro-stratigraphy are now used more systematically. As Butzer (2008: 79–81) has noted, this 'specialized attention to urban sediments and their link to external, environmental processes may elucidate patterns of occupation within individual structures or in the course of changing urban land, growth and decay.'

Where the built environment is more strictly concerned, observations at the meso-scale mostly pertain to analysing the organization of settlements. In the broadest sense of the term, this is the study of urbanism, which encompasses a particular way of life dictated by the gathering of people in the same locale, distinctive morphological features, and functional properties. Of course, not all Minoan settlements qualify as urban and there is a wide range of community sizes, especially after the Late Prepalatial period which witnessed the beginning of the urbanization of Crete (Whitelaw 2012; see also chapter 7). A three-tier hierarchy was originally advocated by Hood, Warren, and Cadogan with 'great cities' (e.g. Knossos, Malia, and Phaistos), 'lesser towns' and a 'countryside [. . .] dotted with farms and villas, isolated or in small groups or hamlets of two or three houses' (Hood et al. 1964: 52). There are indeed good indications for the existence of first-order settlements, second-order sites, and smaller communities with a decreasing frequency as one progresses up the scale (Branigan 2001: 37–41; Whitelaw 2001: 27; 2004: 153). Settlements can also be differentiated on the basis of their location (hilltop, coastal plain, hinterland), the services they provided (administrative/ceremonial, marketing/exchange, agricultural production/storage), and the presence or absence of an elite building (Branigan 1972: 752–3; 2001: 41). Nevertheless, whatever the scale of an agglomeration, what we can tell about it relies heavily on the level of detail provided in descriptions at the micro-scale. At the meso-scale, it is the coordination among buildings and spaces which is of particular interest (Smith 2007; see also chapter 15). In that regard, there are multiple factors that are worth investigating: measures of density, questions of orientation and land-use, identification of cluster or zones within the agglomeration fabric, but also observations pertaining to the formality of the layout and the monumentality of particular urban features. Considered together these elements can clearly enrich our descriptions but, more importantly, if such an analytical process is systematically repeated across a large sample of settlements, powerful comparisons can be drawn. With a special focus on urban architectural inventories, orientation, metrology, and spatial configuration, degrees of standardization or differentiation among Minoan settlements have of course already been highlighted (Branigan 2001; Gomrée 2013; McEnroe 2010; Whitelaw 2001). Comparisons with agglomerations beyond Crete are less common, though. Whitelaw's chapter in this volume is hence clearly a welcome and much-needed addition to our current understanding of Minoan urban environments (see chapter 7).

But what is it exactly that we can extract from these typo-morphological and configurational analyses of Minoan settlements? These detailed descriptions clearly provide more than simple intra-site characterization. They allow us to approach agglomerations as multifaceted phenomena with a wide range of properties. Settlements can indeed be analysed through different lenses, with different questions in mind. Evaluation of site sizes and population estimates feature prominently in studies of Minoan settlements (Branigan 2001; Driessen 2001; Whitelaw 2001, 2004, 2012); they are often mobilized to rank sites but also carry expectations concerning the functions that these agglomerations were allegedly performing. Usually, the larger and more densely populated a site is said to be, the more one is inclined to consider that it provided specialized services to a wider area (Renfrew 2008: 31). Of course, many situations are not as straightforward. Therefore, our detailed descriptions of the built environment also need to aim at assessing the scale and distribution, within settlements, of residential, industrial, civic, and ceremonial activities. Agglomerations are also characterized by varying degrees of social interactions. The articulations between buildings, streets, and open spaces created, from site to site, different opportunities for movement, occupation, and interaction. Documenting these configurational properties is important for developing a more dynamic approach to settlements, and also for refining our understanding of the socio-political organization of communities which often implied recursive interactions between different actors (see chapters 7 and 9). Furthermore, as demonstrated by Fletcher (1995), these factors—residential density, overall extent of settlements, material assemblages and urban features—are all co-implicated in the ultimate growth or decline of towns and cities. One can find a similar idea in the recent works of Batty (2013), or Bettencourt (2013), on cities as dense networks where flows of matter, energy, and information are concentrated and which can potentially act as 'social reactors', provided that appropriate infrastructures exist to sustain such flows. Through such a multi-factorial and diachronic approach to the development of agglomerations, a wide range of presumably connected issues can also be addressed, from political centralization and competitive emulation to technological breakthroughs and the spread of innovations (Lane et al. 2009; see also Part III).

The chapters composing this second part of the volume all address some of these complex problems while exploring how we can devise models and approaches that are attuned to the specificities of Minoan Crete. In chapter 7, Whitelaw addresses first the development of urban centres in the prehistoric Aegean, focusing on evidence for scale, centralization, and differentiation. He then goes on to compare Minoan, East Mediterranean, and Near Eastern urban centres. Working from population scale and differentiation, the characteristics of palaces and temples as organizing institutions and urban layout, he discusses major similarities and differences between these Bronze Age urban traditions. His preliminary exploration—and particularly the broad similarities highlighted—emphasizes the value of more detailed comparisons at all scales from regional settlement size and distribution to the detail of individual institutions and their spatial interrelations within the city for investigating the nature of Minoan and Aegean urbanism. In a combination of structural and phenomenological approaches, Palyvou discusses configurational properties of the Minoan built environment (chapter 8). Characterizing particular urban features such as the indentations of facades or the articulation of the street system, in light of recent space syntax concepts, she underlines major characteristics of urban design, most notably in palatial settlements. With a specific focus on patterns of movement and the sensorial and cognitive impact of particular spatial arrangements, she also highlights forces of attraction and repulsion creating distinctive social interfaces in and around the palaces but also characteristic of Minoan town planning in general. In their extremely detailed analysis of the town of Gournia, Buell and McEnroe develop a multifactorial analysis that aims at understanding the development of the settlement from the Prepalatial period to Late Minoan IB (chapter 9). They combine the diagnostic potential of the study of construction materials with the results of recent stratigraphical soundings, and also with their reassessment of Boyd's original plan of the town, in order to document the periodic expansions, contractions, and reconfigurations of the community. These patterns are also explored through a diachronic approach to the distribution of industrial activities and mortuary practices. Buell and McEnroe's study emphasizes a process of continual change in the various parts of the settlement but also of evolving interactions between actors within the town (the civic-ceremonial authorities in charge of the palace, the groups that maintained monumental houses, and the rest of the residents). Finally, Shaw brings us to Kommos where he proposes a reinterpretation of the long and narrow segment of slab pavement originally presented as a walkway, not unlike the raised causeways found on the west courts of palatial sites (chapter 10). A series of structural details seem to indicate that the infrastructure might actually have served as a slipway for ships during the Protopalatial period; an interpretation which is further supported by its location at the vicinity of later shipsheds. To contextualize this almost unique urban feature in Minoan Crete, Shaw draws parallels with similar installations of later date in the Mediterranean and discusses other harbour facilities in Bronze Age Cretan settlements.

As previously stated (see chapters 1 and 2), it is clear that when social complexity and the built environment are studied as intertwined phenomena, 'top-down approaches need to integrate the micro-scale, just as bottom-up approaches must do the same for the macro-scale' (Knappett 2012: 394). In that regard, the articulating role of the meso-scale, and particularly the question of Minoan urbanism, cannot be underestimated. For example, differentiation among agglomerations through comparative approaches can provide crucial information on site hierarchies and settlement patterns at the macro-scale (see chapters 12 and 15). Of course, towns did not exist in a vacuum: intra-site analyses can also shed light on the relations between a settlement and its hinterland, especially by investigating the material correlates of the hierarchical channelling of resources towards urban centres (e.g. storage areas, ceramic assemblages attesting large-scale consumption of goods, but also road networks and administrative outposts). Detailed descriptions at the meso-scale are also important: they allow us not only to contextualize practices and activities at the micro-scale but also to approach how they were enacted within different communities and how they evolved and varied through space and time.

NOTES

1. See, most notably, numerous articles in the journal *Creta Antica*.
2. Cf. chapters 3 and 9; see also *British School at Athens. Annual Report 2013–2014*: 22–7 for the PALAP and Gypsadhes projects.
3. <http://www.ims.forth.gr/index_main.php?c=33&l=e&d=7>.

REFERENCES

Batty, M. 2013. *The New Science of Cities*. Cambridge, MA: MIT Press.

Bettencourt, L. 2013. 'The Origin of Scaling in Cities'. *Science*, 340.6139: 1438–41.

Branigan, K. 1972. 'Minoan Settlements in East Crete'. In *Man, Settlement and Urbanism*, edited by P. J. Ucko, R. Tringham, and G. W. Dimbledy. Cambridge, MA: Schenkman: 751–59.

Branigan, K. 2001. 'Aspects of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 38–50.

Butzer, K. W. 2008. 'Other Perspectives on Urbanism: Beyond the Disciplinary Boundaries'. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. A. Sabloff. Santa Fe, NM: School for Advanced Research Press: 77–92.

Cunningham, T. 2007. 'In the Shadows of Kastri: An Examination of Domestic and Civic Space at Palaikastro (Crete)'. In *Building Communities. House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fischer, and J. Whitley. London: British School at Athens: 99–109.

Devolder, M., I. Caloi, and T. Gomrée. Forthcoming. 'Le Bâtiment Dessenne. Étude et nouveaux sondages'. *Bulletin de Correspondance Hellénique* 139.2.

Driessen, J. 2001. 'History and Hierarchy: Preliminary Observations on the Settlement Pattern of Minoan Crete'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 51–71.

Fletcher, R. 1995. *The Limits of Settlement Growth: A Theoretical Outline*. Cambridge: Cambridge University Press.

Gomrée, T. 2013. 'La voirie des villes minoennes en Crète orientale et à Cnossos (Minoen Moyen I—Minoen Récent I)'. PhD dissertation. Université Lumière Lyon 2.

Hood, S., P. Warren, and G. Cadogan. 1964. 'Travels in Crete, 1962'. *Annual of the British School at Athens* 59: 50–99.

Knappett, C. 2012. 'A Regional Network Approach to Protopalatial Complexity'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 384–402.

Lane, D., D. Pumain, S. van der Leeuw, and G. West (eds). 2009. *Complexity Perspectives in Innovation and Social Change*. New York: Springer.

McEnroe, J. C. 2001. *The Architecture of Pseira*. Philadelphia, PA: University of Pennsylvania Museum of Archaeology and Anthropology.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Platon, L. 1990. 'L'urbanisme minoen. B. Espace intérieur et espace extérieur dans la ville minoenne'. In *L'habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Athens: École Française d'Athènes: 381–93.

Renfrew, C. 2008. 'The City through Time and Space: Transformations of Centrality'. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. A. Sabloff. Santa Fe, NM: School for Advanced Research Press: 29–51.

Shaw, J. and M. Shaw. 1996. *Kommos I: The Kommos Region and Houses of the Minoan Town,* Part 2: *The Minoan Hilltop and Hillside Houses*. Princeton, NJ: Princeton University Press.

Shaw, J. and M. Shaw. 2006. *Kommos V: The Monumental Minoan Buildings at Kommos*. Princeton, NJ: Princeton University Press.

Shaw, M. and J. Shaw (eds.). 2012. *House X at Kommos, A Minoan Mansion Near the Sea.* Part 1: *Architecture, Stratigraphy, and Selected Finds*. Philadelphia, PA: INSTAP Academic Press.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6.1: 3–47.

Soles, J. 2003. *Mochlos IA. Period III. Neopalatial Settlement on the Coast: The Artisans' Quarter and the Farmhouse at Chalinomouri. The Sites*. Philadelphia, PA: INSTAP Academic Press.

Whitelaw, T. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Whitelaw, T. 2004. 'Estimating the Population of Neopalatial Knossos'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 147–58.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 114–76.

7

The Development and Character of Urban Communities in Prehistoric Crete in their Regional Context

A Preliminary Study

Todd Whitelaw

This chapter is a preliminary sketch of an approach to analysing Minoan and Aegean urbanism in the Bronze Age. It comprises two sections, the first an outline of urban development, focusing particularly on the Cretan evidence but situating that in its southern Aegean context, on the far western fringe of Eurasian Bronze Age urban societies. The second section is a preliminary comparative exploration of the Cretan data in the context of Bronze Age urbanism in the broader East Mediterranean and Near East. This is aimed at assessing whether, despite its geographical remove, Minoan urbanism shares significant characteristics with other examples of Bronze Age, institution-focused urbanism, and whether the diversity of the latter, with their more extensive textual documentation, may potentially provide models which can help us to analyse the Cretan evidence.

7.1. INVESTIGATING URBANISM

Today, urban status tends to rely on bureaucratic and legal definitions, which vary arbitrarily between jurisdictions (Roberts 1996). They are usually based on population size, sometimes on areal extent, but the underlying idea is that the size of the population interacting in a community has an impact on the nature of those interactions, with larger communities being more complex, with individuals, through spatial propinquity, being able to interact with greater numbers of other individuals, interact in more complicated ways, and require more organization and infrastructure to facilitate these interactions (Bairoch 1988; Mumford 1966). This is well documented through recent analyses that explore the intensification of social interactions in larger cities (not just more, but more per person), whether positively, as measured through, for example, GDP or innovation rates, or negatively, through crime rates (Bettencourt et al. 2007, 2010). Moving away from modern industrial and post-industrial contexts, viewed cross-culturally, it has long been established that the largest community in a culture provides a general index of overall cultural complexity, measured in a variety of ways (Carneiro 1967; Tatje and Naroll 1970; McNett 1970). The point is not to use such cross-cultural measures to make any top-down assessments of Aegean urbanism (we know Middle Minoan and Late Minoan/Late Helladic society is complex and urbanized), but to highlight that trying to understand the nature of urban society, rather than simply name or classify it, is important. On the contrary, defining new vague categories, such as 'proto-urban' (Renfrew 1972: 238), which is applied in Aegean prehistory to just about any community after the Neolithic, tells us little. But this does highlight one typical approach—'urban' is used as a valuation or assertion of significance (my site is urban, so it was important, and justifies the decades devoted to investigating it), rather than analytical framework.

For informative analyses, we need a clearer idea of what characteristics are important about urban communities, why, and what focusing our analyses on such characteristics can tell us. Substantive definitions of urbanism, trying to distil the crucial characteristics which make a community urban, recognize various dimensions which can be broadly summarized as scale, concentration, and differentiation (Wirth 1938; Morley 2011). Urban centres are usually significantly larger than the norm in their culture, with abnormally large populations; the smallest (though arbitrary) cut-off I have come across in the literature is a population of 5,000 individuals. These are not just larger than other communities on a continuum, but are a distinct mode—they usually stand out from a much larger number of smaller communities, implying a different character and role. They represent a higher concentration of population (usually at greater residential densities), with all the social integrative challenges this will entail. This larger population will also, inevitably, be more differentiated than a village population, for all the reasons which are the foundation of geographical economic and social settlement models, in occupational specializations, wealth, social groups, etc. As these communities are more complex than the bulk of those surrounding them, we need to think in terms of both intra- and inter-community differentiation. Cities create different types of social and interaction environments; through numbers, they also create new social problems or challenges, which must be met organizationally to enable individuals to interact effectively beyond purely kinship or village scales of integration (Feinman 1998, 2011; Kosse 1990, 1994).

7.2. URBANISM IN SOUTHERN AEGEAN PREHISTORY

The urban phase in the prehistoric southern Aegean lasted most of the second millennium BCE, with significantly different timescales and trajectories on Crete and the southern mainland. This was limited in time and space, but also was a very restricted phenomenon. Here we run into definitional problems, with communities as small as a hectare, with at most a few hundred residents, regularly hailed as urban. Sites such as Hagia Irini on Keos (Schofield 2011), with several hundred occupants, are by any modern definition nowhere close to urban, but the argument is essentially that they participated in a more generally 'urban' form of culture (see chapter 14). By our earlier criteria, they are larger than the contemporary farmsteads and hamlets that surround them, but not by all that much. They represent a relative concentration of population, but again, on a small scale. Finally, we can anticipate that they had a more differentiated population than the surrounding hamlets, in this case involving elite (House A), at least part-time religious specialists (the Temple), and probably at most, part-time craft specialists pursuing cottage industries in many houses in the community. But held up against contemporary Knossos, with the order of 22,000–25,000 occupants, a palace thirty times the scale of House A at Hagia Irini, and almost certainly a comparable differential in support personnel and the resources required to construct and maintain the establishment, and administering a territory at least twenty-five times as large, where is it realistic to draw the divide? Is Hagia Irini urban, or not? Drawing a line and assigning a classification is not particularly insightful, but thinking about what urbanization means raises interesting questions, encouraging us to try to understand the nature of each of these communities in terms of their own nature, but also in context.

In the following assessment, I shall draw on data from a number of the surveys that have been conducted on Crete and the mainland (principally the Peloponnese), and are documented in a way that facilitates comparisons in terms of the definition of site size and periods of occupation. I am interested in the general site size distributions, so have excluded sites which are complex palimpsests, where one cannot make an educated guess at the rough occupation size within the chronological period of interest. On the figures, I will add other well-known sites in each region (usually outside the surveyed regions), to serve as calibration points. In the figures, I distinguish between mainland and Cretan patterns, given the divergence in settlement behaviour on Crete from the start of the Middle Bronze Age, with the first states and urban

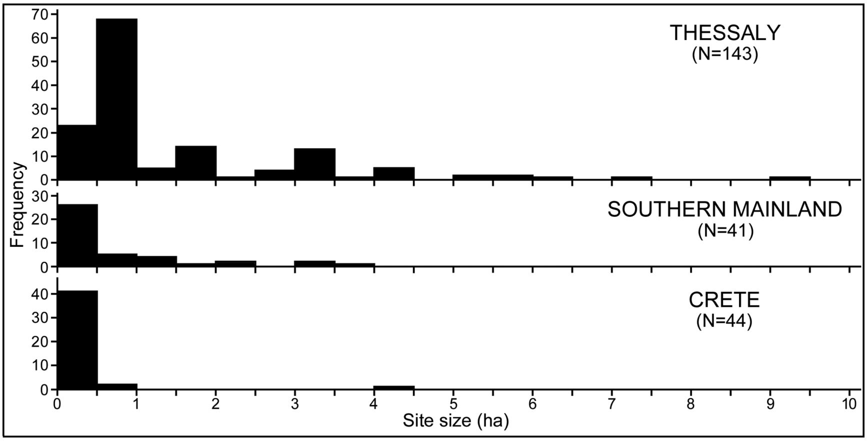

Fig. 7.1. Greek mainland and Cretan surveys: Neolithic site size.

communities. We do not see this urbanization process on the mainland until the end of the Middle Bronze Age.

In earlier prehistory, on both Crete and the mainland, we are dealing with landscapes of farmsteads, hamlets, and generally small villages (Fig. 7.1). For the Neolithic, I include a histogram of Neolithic site sizes in Thessaly, simply for reference, since so many more Neolithic sites have been studied there than in the south. There are clear similarities in scale across all regions, with most communities well under a hectare in size, indeed mostly less than half a hectare, so probably farmsteads and hamlets with less than fifty inhabitants. On both the mainland and Crete, local regions tend to have one village of up to a few hectares, but most communities were much smaller. Very few southern mainland sites have been extensively exposed, so for internal differentiation we have to look to Thessaly. In the earlier Neolithic all houses are small and comparable in scale, fitting what we would expect for undifferentiated egalitarian communities. At a small number of later Neolithic sites, such as Dimini and Sesklo, there is a central structure, slightly larger than the rest though with comparable features and finds, but arguably representing the start of intra- and probably inter-community differentiation.

On Crete, at Knossos and Phaistos, the only extensively explored Neolithic sites, there have been only limited area excavations. Recently, it has been suggested that there were open areas at the core of each site, perhaps venues for communal activities (Todaro and Di Tonto 2008; Tomkins 2012), though with only limited horizontal exposure away from the cores, it is far from clear that these are more significant than the spaces between houses elsewhere at each site. For Final Neolithic Phaistos, this village was considerably larger than any contemporary community nearby, and such sites may have acted as local centres for the inhabitants of neighbouring farms and hamlets.

In fact, farms and hamlets dominate the settlement record throughout most phases of prehistory in the Aegean. Based on survey data, the picture is one of long-term continuity of very small sites. What changes through time is principally the number, size, and spatial distribution of very restricted numbers of larger sites. Despite this broad, long-term continuity in site sizes, it is worth noting that (based on more extensively excavated sites) this continuity in site size masks a significant increase in occupation density, such that from the Early Bronze Age onwards, sites will usually represent populations two to three times larger than their similarly-sized Neolithic precursors.

The most convincing evidence for Early Bronze Age centralization and differentiation comes from a small number of excavated communities on the southern mainland. Most centres were on the 1–2 ha scale, though a few sites exceed this (Fig. 7.7). A small number of the larger communities (still usually only 1–2 hectares), have individual monumental buildings, best represented by the House of the Tiles at Lerna. Recognition of how these sites were geographically integrated with their smaller neighbours is usually handicapped by patchy survey coverage (Whitelaw 2000: Fig. 10.4). But in surface survey data, the limited number of such central sites may be confirmed by the few sites with clay roof tiles and seal-impressed large hearth rims (Jameson, Runnels, and van Andel 1994). This hints at limited centralization and differentiation, with obsidian production debris and imported millstones concentrated at, or even limited to, such larger villages (Kardulias 1992; Carter and Ydo 1996).

From Cretan surveys and excavated sites (Fig. 7.2) we can reconstruct a few small centres of 3–6 ha, most clearly represented by those that were to become

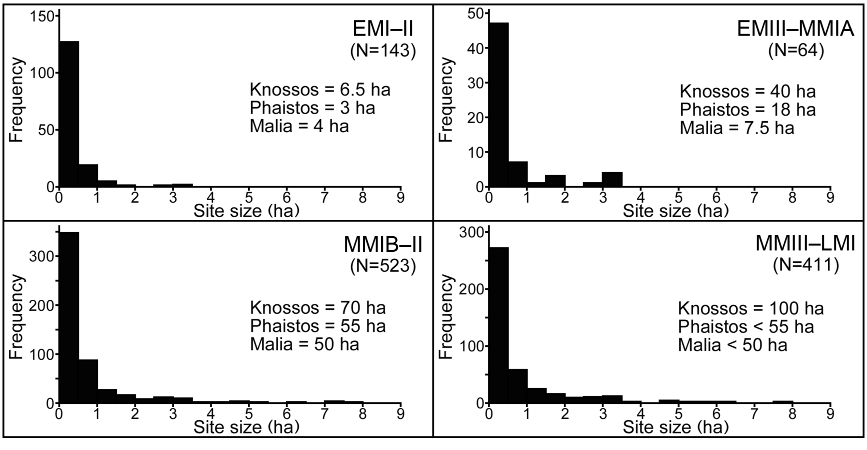

Fig. 7.2. Cretan surveys, site size: Early Minoan I–II (top left); Early Minoan III–Middle Minoan IA (top right); Middle Minoan IB–II (bottom left); Middle Minoan III–Late Minoan I (bottom right).

the later palatial centres at Knossos, Phaistos, and Malia, arguably acting as focal communities for local regions (Whitelaw 2012). This represents only minimal expansion from the Final Neolithic situation, though as noted, the continuities in settlement sizes probably mask a doubling or tripling in population, with more dense occupation, particularly at these larger centres (Whitelaw 2012: 149–51).

Urbanization occurs on Crete at about 2100–2000 BCE, in the Late Prepalatial (EM III–MM IA) period, only conclusively documented so far at the extensively investigated sites of Knossos, Malia, and Phaistos. Despite uncertainties due to the very different data on which these reconstructions have to be based, the three centres seem to expand in pace with each other, from the Prepalatial into the Protopalatial period (reaching about half a square kilometre in the Protopalatial period), over the course of about 250 years (Whitelaw 2012). At Knossos, this late Prepalatial transformation is represented by very significant and rapid expansion, from some 7 ha to over 40 ha. Data from regional surveys show this population growth is a general island-wide pattern (Fig. 7.3), that the rapid urban expansion is not simply the result of local nucleation from the territories surrounding each expanding centre, though this may also have contributed (Watrous, Hadzi-Vallianou, and Blitzer 2004: 268–71).

Significant expansion at these major centres continues through the Protopalatial period. Phaistos and Malia parallel each other, but the recent survey evidence from Knossos suggests it outpaced the other two, reaching some 60–70 ha by the end of the period. For Phaistos and Malia, we should be thinking of 10,000–12,500 inhabitants, for Knossos 12,000–17,500. Considered in their local contexts, while Phaistos and Malia might have been self-sustaining in deriving sufficient subsistence from their immediate territories, I think they may have been pushing the logistical limits. But Knossos probably already was having difficulty supplying itself from its immediately accessible surrounding territory (Whitelaw forthcoming B).

Some analysts have very optimistically read a five-level settlement hierarchy on to these site distributions (Driessen 2001; Watrous, Hadzi-Vallianou, and Blitzer 2004; Hayden 2004; Haggis 2005; Watrous et al. 2012), so it is worth emphasizing that the vast bulk of sites continued to be farmsteads and small hamlets, and the second-order communities, if they can even be called that, were just villages, less than 4 ha, with at most 400–800 inhabitants. The very few urban centres were surrounded by small villages and hamlets, very much a classic, highly centralized, city-state structure (Fig. 7.4).

The Minoan palaces of the Protopalatial period document a completely novel scale of differentiation, within and between communities, in terms of the central palatial buildings and the organization, resources, and labour necessary to construct and sustain them. While we often assess the period primarily through the palaces themselves, the situation also changed dramatically in terms of the now fully urban cities surrounding them. For considering urban

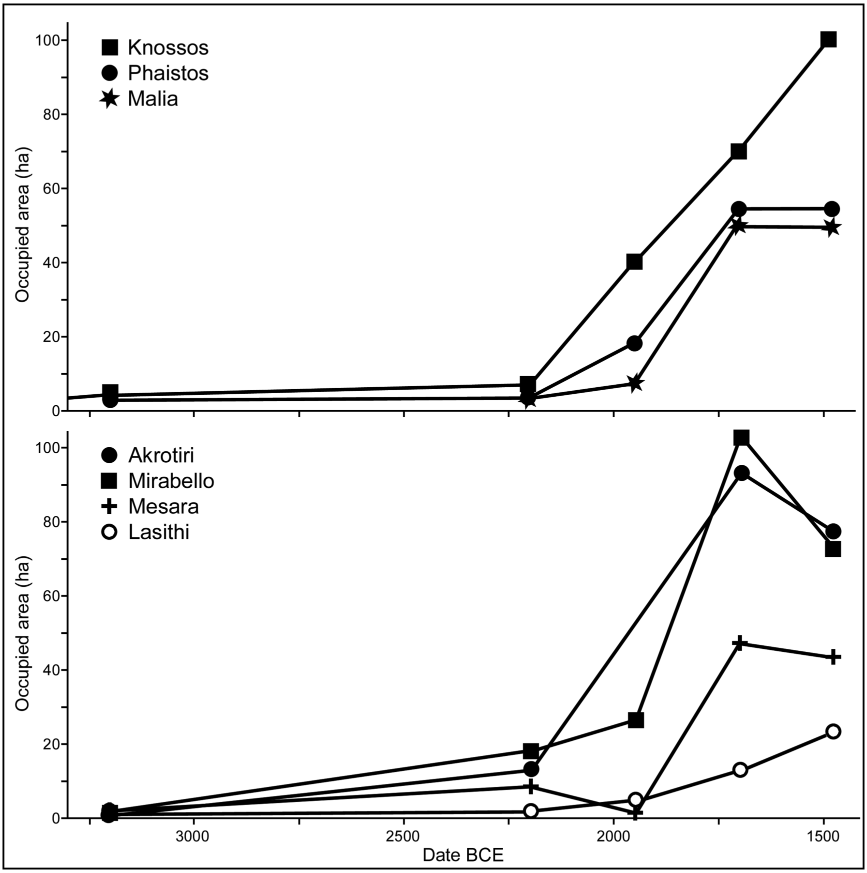

Fig. 7.3. Cretan surveys, aggregate site area: urban centres (top); regional surveys (bottom).

organization, our most comprehensive picture is from Protopalatial Malia, where there have been very extensive excavations at the core of the site (Fig. 7.5; van Effenterre 1980; Poursat 1988; Schoep 2002b, 2004). In addition to the palace, other specialized, non-domestic structures, so far unique to Malia, include the Agora, Centre Politique, Crypte Hypostyle, Quartier Mu, the small shrines, and the fortification wall. Quartier Mu and its associated maison-ateliers, excavated completely and being published thoroughly, holds out particular promise for understanding a major element in Minoan urban structure. Its large, spatially differentiated central structures, with evidence for administration, storage, cult, and ceremony, provide precisely the sort of evidence anticipated, but not preserved or documented well, for the palace itself. The directly associated, specialized workshops (Poursat 1996) evoke a model of attached, dependent, or client craft production.

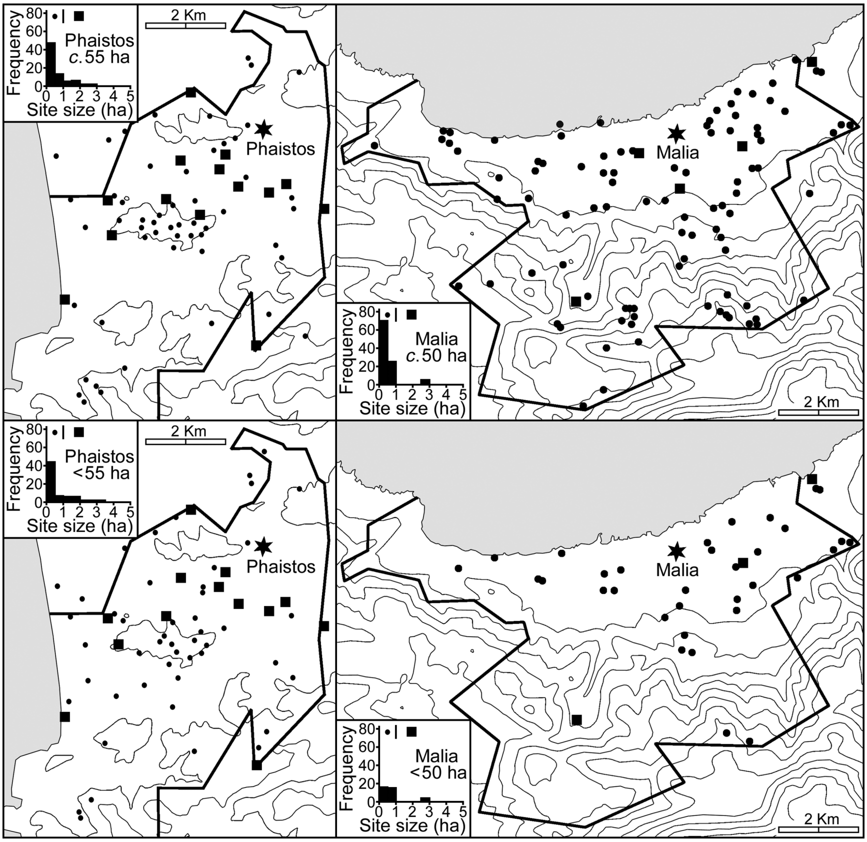

Fig. 7.4. Minoan settlement patterns: Protopalatial West Mesara and Malia (top); Neopalatial West Mesara and Malia (bottom).

There are indications that there were multiple such institutions within the town (the Magasins Dessenne, a possible predecessor of Quartier Epsilon), raising questions about how they related to each other, but also to the palace. Rarely commented upon, they are comparable in scale and elaboration to structures that we see as the foci of later Neopalatial smaller communities and indeed polities, such as the palaces at Gournia and Petras in East Crete (Fig. 7.6). Malia, and by extension the other Protopalatial palatial centres, were highly differentiated urban communities.

The relatively poor documentation of early large-scale excavations limits our understanding of broader community composition and structure, but reanalysis of early records is proving fruitful. While probably over-optimistic, consideration of tools and craft production debris at Neopalatial Gournia gives an idea of widespread small-scale, part-time cottage crafting in the town (Watrous and Heimroth 2011; Branigan 1972). As another index of

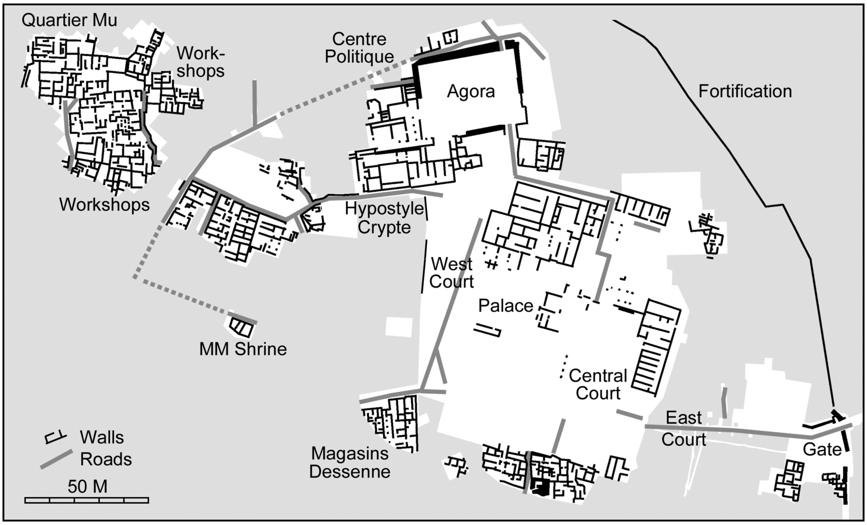

Fig. 7.5. Malia Protopalatial differentiation.

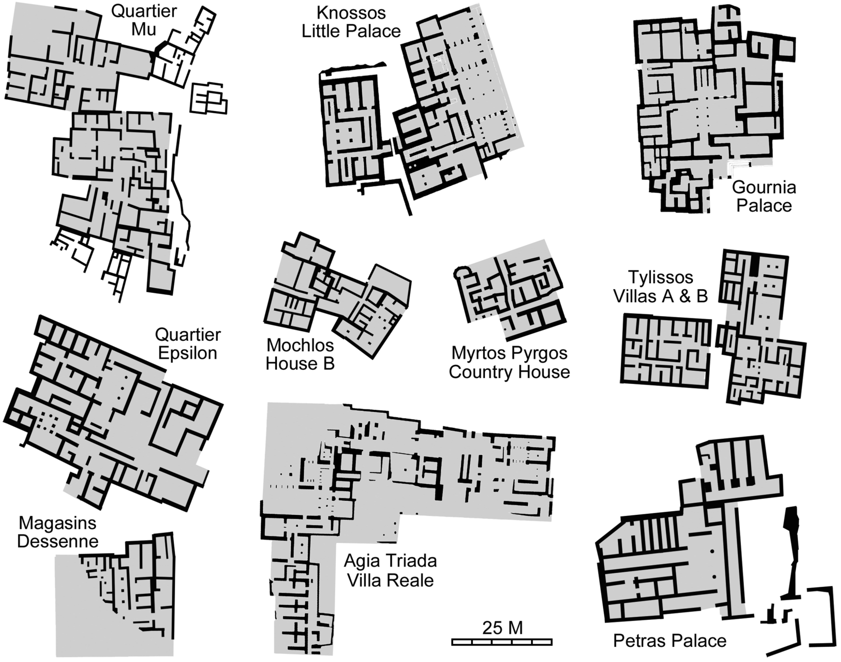

Fig. 7.6. Minor institutional structures.

differentiation, I have elsewhere used the size distribution of Neopalatial houses (Whitelaw 2001a), which relates to functional distinctions in room use, but also investment in construction and elaboration, so probably representing wealth and social distinctions. This assessment by house area is now supported by explicit calculations of the labour invested in individual house construction (Devolder 2013; see also chapter 4). While limited by the highly selective areas excavated at each site, the available data point not only to intra-site but also to inter-site distinctions—for example between the major centres, where there is a larger range of house sizes, and smaller communities such as Gournia and Pseira, composed of more uniformly small houses (Whitelaw 2001a).

In the Neopalatial period, Knossos continued to expand, reaching about 100 ha. At documented Neopalatial occupation densities (Whitelaw 2004), I would estimate it had 22,000–25,000 occupants. Current re-evaluations at both Phaistos and Malia suggest significant declines in occupation at both sites after major MM IIB destructions. How far they contract remains unclear, but they appear to have reached their maximum extents and populations in the Protopalatial period.

In most regional surveys, both site numbers and overall aggregate occupied areas decline a little from Protopalatial maxima. This seems particularly marked in preliminary data from the Malia survey (Müller-Celka, Puglisi, and Bendali 2014), but since the sites that are lost are all very small, the implications in terms of population are more limited than the site numbers might suggest (Fig. 7.4). Within most regions, the settlement size distribution is comparable to that in the Protopalatial period, and still extremely primate, with no development of major secondary centres (Fig. 7.2). But the Neopalatial period sees a significant divergence of regional trajectories alongside the continuing expansion of Knossos (Fig. 7.3). This urban expansion provides new support for the frequent assertion that Knossos dominated at least the centre of the island by the later Neopalatial period (Whitelaw forthcoming A, forthcoming B). At twice the size of any other community, it will almost certainly have housed a more complex and differentiated population (Whitelaw forthcoming B). In contrast to other regions, it is only in the Knossos region that we can clearly recognize second-order centres, in the 4–10 ha size range (Whitelaw 2001a). This suggests Knossos stood at the head of a more complex and differentiated settlement system than is documented anywhere else on Crete. These second-order centres (e.g. Tylissos, Archanes, Poros, Amnisos, probably Galatas), like the small, probably independent palatial centres in East Crete (Gournia, Petras), are considerably scaled-down versions of the major centres, with small central buildings at their core, presumably the residences of controlling local elites.

The southern mainland witnessed much later urban development. As on Crete, in most periods of prehistory it is fundamentally a landscape of farms and hamlets (Fig. 7.7). But significant centres began to develop at the very end

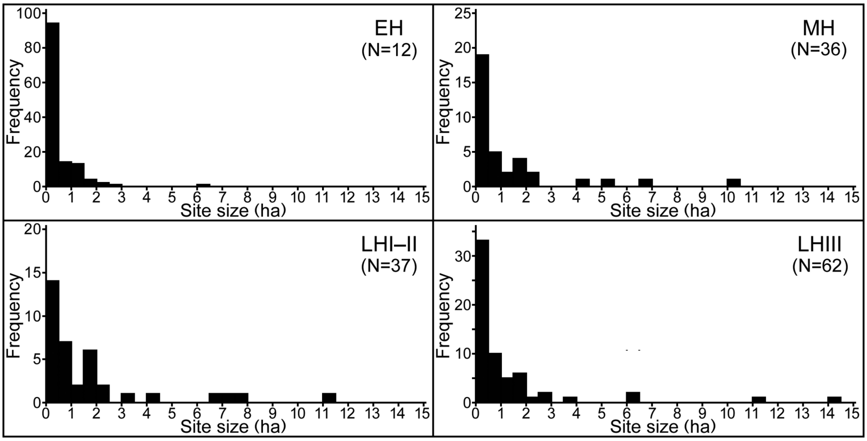

Fig. 7.7. Mainland Greek surveys, site size: Early Helladic (top left); Middle Helladic (top right); Late Helladic I–II (bottom left); Late Helladic III (bottom right).

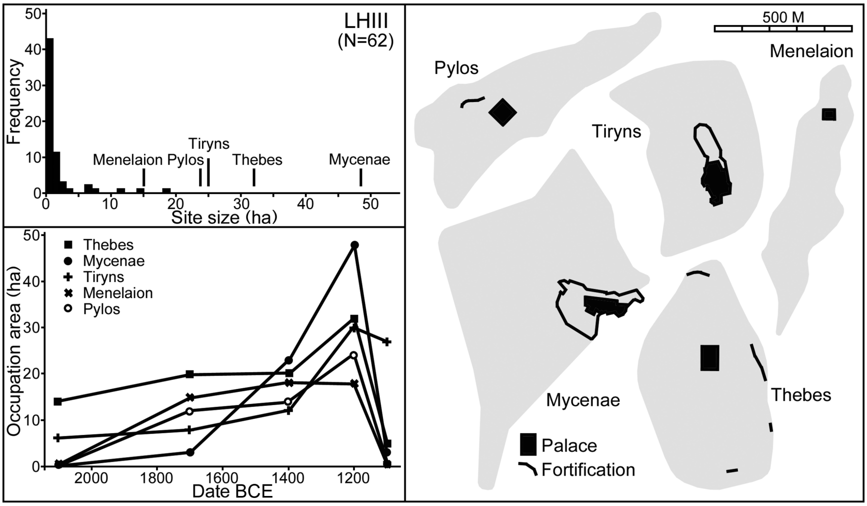

Fig. 7.8. Mainland palatial centres, growth through time and site extent.

of the Middle Bronze Age, from *c.*1700 BCE and especially in the fourteenth and thirteenth centuries BCE, the palatial Late Helladic III phase.

We have a number of major Mycenaean palatial centres that the Linear B palace archives indicate were centres for very extensive states. Figure 7.8 plots very approximate data for the development of these centres. These document a slower, more drawn-out process than on Crete. It is also more variable—which is perhaps not surprising, with these centres spread out over a much larger region—though the data for most sites are also rather more patchy and unreliable than for the Cretan examples. Most palatial centres are in the 20–30 ha range. With lower occupation densities than on Crete (perhaps 100–150/ha), they will have had on the order of 2,000–4,500 residents, though Mycenae, possibly more than 40 ha, will have had perhaps 4,500–6,500. These are all within the range of agriculturally self-sufficient centres—Mycenae possibly just so, particularly given that a significant component of its immediate catchment is mountainous and uncultivable.

The Linear B tablets document the administrative structure of a large Mycenaean polity centred on Pylos in Messenia, organized in some sixteen districts. This is the approximate number of sites larger than 2 ha that we know through extensive surveys in Messenia (Whitelaw 2001b). So we can envision sites such as Nichoria and Malthi as originally politically independent local centres, incorporated as subsidiary centres into the expanding Pylian state (Bennet 1999). Bearing in mind that rapid extensive surveys tend to underestimate site size, these subsidiary centres are probably on the scale of 2–6 ha, comparable to those in the wider territory of Neopalatial Knossos.

Considering site sizes, in agrarian states, maximum community size tends to be severely constrained by the productivity of the territory that can be farmed directly by the residents of the community, its agricultural catchment (Wilkinson 1994). This is basically a logistical problem, with the efficiency of agricultural labour and the transport of bulk agricultural produce dropping rapidly with distance, a fundamental tenet of geographical locational models (Chisholm 1968). These constraints can be seen clearly in the city-size distributions of other pre-industrial states, with the exceptions being administrative capitals of large empires, almost invariably situated in coastal or riverine locations, enabling bulk goods transport by water. A comparison with the size distributions of the better understood historical Mediterranean examples of Classical Greek and Roman cities supports this point, but also raises another (Fig. 7.9). With occupation densities of Greek and Roman cities typically in the range of 150–200 persons/ha, one can see a marked drop in the number of cities at 20–30ha, representing communities of 3,000–6,000 people. In a Mediterranean landscape, if we grossly assume 1 ha of agricultural land to support each person, the territory to support these small urban centres will have a radius of 3 to 4.5 km, or a one-hour walk. Cities larger than this might have a network of small hamlets and villages supplying subsistence to supplement that produced by residents of the city—satellite communities within a city state.

A second point to extract from this gross comparison is the contrast in mid-sized centres, abundant in the Classical Greek world of independent small city-states and in the later Roman world of a large-scale politically integrated empire, but nearly absent in the Bronze Age command economies of the palace-centred polities. These latter appear to suppress the development of a

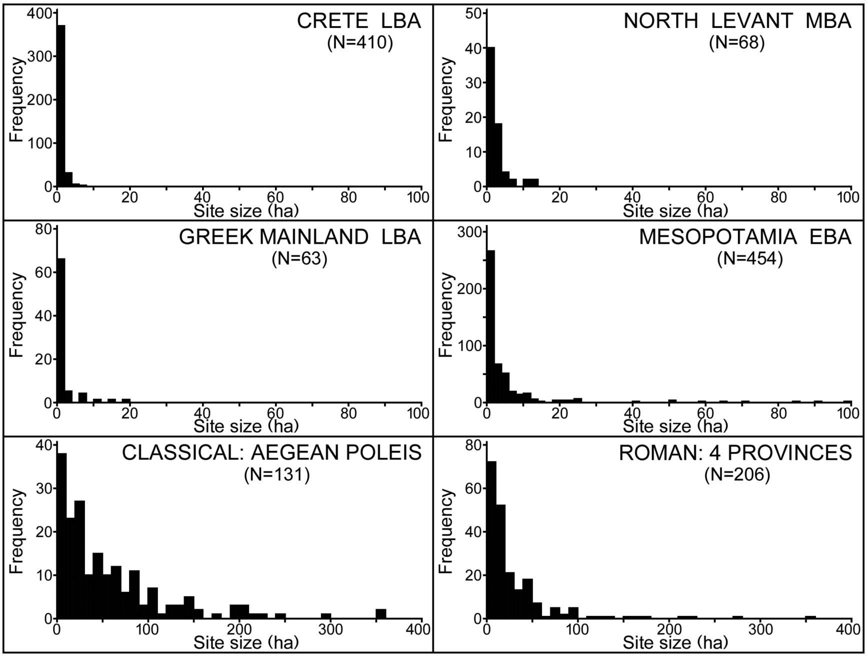

Fig. 7.9. Logistical limits on urban size: Crete (top left); north Levant (top right); Greek mainland (centre left); Mesopotamia (centre right); Classical Greek (Aegean cities) (bottom left); Roman (Britain, Spain, Gaul, Anatolia) (bottom right).

more mature and economically more effective settlement hierarchy, one that would fit the classic central-place geographical models. Returning to the definitional question raised at the start, this marked contrast between major centres and the remaining, generally very small communities makes it far easier to draw a distinction between urban and non-urban communities, and raises expectations about significant contrasts in population differentiation between these seemingly quite distinct categories of community.

Comparing urbanization on Crete and the mainland (Fig. 7.10), the process started earlier on Crete but also generated larger centres, and it appears to have been a more rapid process. This would have been more of a challenge for people trying to cope with the novel demands of a rapidly expanding and increasingly differentiated urban population. This would probably require more rapid innovation, social and economic, to cope with and sustain such growth. Only at Mycenae, in the later palatial period, do we possibly see a comparably rapid process, though the excavated evidence outside the citadel to base these estimates on is extremely patchy. Mycenae's development may, like that of the Cretan centres, have created new subsistence and logistical problems, requiring social and political as well as potentially technological

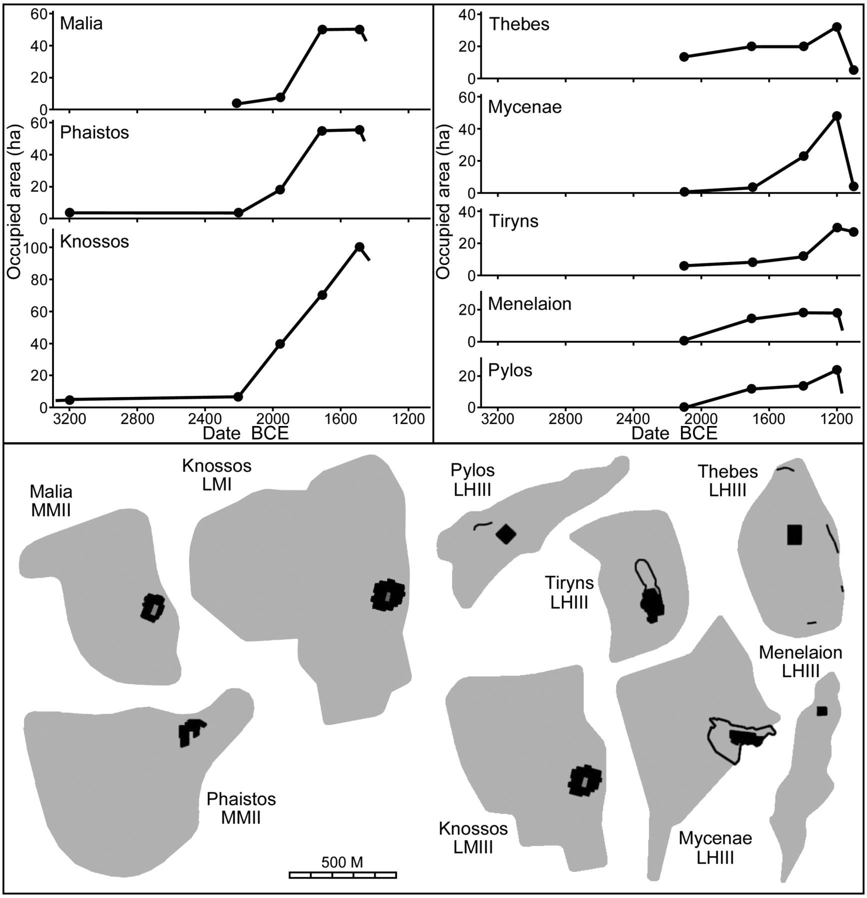

Fig. 7.10. Cretan and mainland centres: growth patterns (top); site extent (bottom).

solutions. In the latter sense we have evidence of a scale of landscape manipulation, with Mycenaean dam building and the draining of the Copais (Knauss 2001), wholly different from anything documented on Crete. It is also interesting that the earlier Cretan administrative centres were larger, for smaller polities, and the later Mycenaean polities were larger, but administered from somewhat smaller centres. This may suggest these represent different types of administrative organization, and at least some variation between the regions in terms of the nature of urban centres. Interestingly, in the Final Palatial period on Crete, when the Linear B tablets indicate that Knossos dominated politically at least two-thirds of the island, the centre declined in size, perhaps suggesting that the territory could not really sustain the more extensive Neopalatial city.

7.3. UNDERSTANDING URBAN COMMUNITIES: ARCHAEOLOGICAL APPROACHES AND ANALYTICAL MODELS

Ancient urbanism is receiving expanding interest in archaeology worldwide, as witnessed by the increasing number of edited volumes (e.g. Storey 2006; Marcus and Sabloff 2008a; Laurence and Newsome 2011; Guadelupe Mastache et al. 2008; Osborne and Cunliffe 2005; Smith 2003; Vermeulen et al. 2012; Creekmore III and Fisher 2014). The emphasis is predominantly descriptive, rather than synthetic, analytical, or interpretive, though there are some exceptions (e.g. Clark 2013; Yoffee 2015). Some regional analytical studies (e.g. Novák 1999b; Margueron 2013; Smith 2008; Laurence et al. 2011), and likewise an increasing number of site-specific studies (e.g. Kemp 2012; Luis de Rojas 2012; Farrington 2013; Masson and Peraza Lope 2014; Cowgill 2015), consider the nature of ancient urbanism. This primarily descriptive emphasis is hardly surprising, not just within a regionally and temporally highly subdivided discipline emphasizing site-based fieldwork, but also considering the urban models developed in geography and sociology, which are, unsurprisingly, addressed at industrial and post-industrial cities. While occasionally explicitly considered by archaeologists (Marcus and Sabloff 2008b), they provide little guidance, not only because of the completely different social and economic structures of the societies involved but also because of scale. Pre-industrial cities are generally minute in comparison to modern metropoleis, so models of organizational structure fundamentally predicated on land rents, movement costs, and economies of scale tend to be largely irrelevant, except possibly in the case of exceptional mega-cities such as Memphis, Rome, or Teotihuacan.

A second set of problems focuses on the purpose of the models developed. Those addressed at pre-industrial urbanism are almost exclusively designed to provide a foil to modern cities; they are not particularly aimed at analysing the nature of pre-industrial cities (Liverani 1997), as indeed is guaranteed by any assumption of a uniform model of cities in all pre-industrial contexts (Sjoberg 1960; Weber 1958). These limited and largely retrospective concepts are increasingly being replaced by empirically based studies, for example of medieval European cities (e.g. De Vries 1984; Nicholas 1997; Clark 2009), and Roman urbanism (Bowman and Wilson 2011; Parkins 1997a; Laurence, Cleary, and Sears 2011). But it also remains the case, in considering urban history, that most Western discussions of ancient urbanism are dominated by the characteristics of Classical Greek and Roman cities, seen as ancestral to the Western urban tradition. There is far less interest in, access to, or theorization about other early urban traditions, including Sub-Saharan African, Egyptian, and West, South, South-east, or East Asian. In some sense, the interest in and independence of theorizing on Pre-Colombian urbanism (Smith 2008; Sanders and Santley 1983; Marcus 1983; Guadelupe Mastache et al. 2008; Luis de Rojas 2012; Farrington 2013; Masson and Peraza Lope 2014; Cowgill 2015) may be prompted precisely because it is so obviously independent of the Western tradition.

Moving away from such modern Western and fundamentally inappropriate models, current archaeological research seems to be polarizing in two directions. One, more traditional, is descriptive and classificatory, trying to be more systematic and comparative in recognizing material patterns (e.g. Smith 2007, 2011), but without identifying why these material patterns are substantively significant—what do they tell us about ancient societies? A second, consistent with the interpretive turn in archaeology, looks at cities as symbols (e.g. Yoffee 2015). This can be particularly effective in contexts where literary texts or rich and abundant iconography can give us an idea of emic concepts (e.g. Baines 1995, 2015a, 2015b; O'Connor 1998; Barjamovic 2011; Grabbe and Haak 2001; Novák 1999b, 2004; Hansen 1997; Purcell 2007); but in essentially prehistoric contexts, we usually end up simply projecting our own assumptions. To bring this closer to home, what evidence could actually support the regularly repeated assertion that Knossos, in the later Bronze Age, was considered to be a 'cosmological centre' (Soles 1995; see also chapter 15)? In between these extremes is a largely unexplored analytical space where we need to address what cities are, why they exist, what roles they play, and why they are important in societies. This relative lack of interest in why cities exist, and in their distinctive roles, is particularly curious since it has long been widely accepted that they are the principal crucibles for the development of innovations in culture in recent millennia around the globe, as they remain today (Redfield 1953; Friedmann 1961; Mumford 1966; Eisenstadt and Shachar 1987). But even this overall assumption needs to be challenged; to what degree is this relevant, and in what ways, to ancient urban centres in specific cultures and contexts? That model is largely based on modern and recent contexts, from cities within highly integrated regional, interregional, and, today, globalized systems. This question applies at the inter-city scale but also at the more local scale of the integration of a city with its hinterland, embodied to a degree in debates about ancient cities as producer or consumer cities, particularly developed in Roman history and increasingly in archaeology (Whittaker 1995; Parkins 1997b; Mattingly 1997; Erdkamp 2001, 2012, 2015), to a lesser extent in analyses of the Greek city (Finley 1973; Hansen 2004).

In Bronze Age contexts similar concerns have begun to be addressed, though tangentially rather than directly, in arguments for and against the patriarchal model of ancient Near Eastern societies (Schloen 2001; Ur 2014; Stone and Kemp 2003; McGeough 2007), and are relevant to the model of fractal social structures (Lehner 2000; Kemp 2012; Knappett 2009). At first reading, this seems to imply that cities are simply aggregates—with more of the same, articulated within similar structures at a higher level—rather than more differentiated and more complex societies. But it is not just a matter of scaling-up if, as traditionally argued, there are emergent properties and structures with larger demographic scale; unique problems of integration, but also novel synergies. If the more traditional view is valid then the patriarchal household terminology of ancient texts is primarily metaphorical, rather than practical. To a degree, a variant of the simpler model may find support in recent work on Linear B administrations, which has moved dramatically away from the traditional highly centralized redistributive model (Finley 1957; Renfrew 1972; Killen 1985) to one defining a much more limited range of palatial economic interests (Halstead 1999, 2011; Whitelaw 2001b; Bennet 2008; Voutsaki and Killen 2001; Bennet and Halstead 2014). While this may be consistent with the relatively low level of centralized taxation, with only limited relevant documents it is difficult to assess administrative reach, for example in terms of kingdom-wide property rights and corvée labour obligations. It is tempting to see the Linear B administrative system as particularly characteristic of the Mycenaean polities, and to fall back on a century of bias and assume that earlier Minoan administrative systems and urban communities were more complex. But structural similarities between Mycenaean and Levantine administrative and economic structures, as documented through texts at Ugarit and Alalakh, should caution us against assuming that Minoan administrative systems were necessarily more complex. At present, without a more systematic assessment, one returns to the contrast drawn above between Hagia Irini and Knossos—is it valid to see the village at Gournia, with its central palace, as fully comparable to Knossos, some twenty-five times larger?

To date, discussions of Minoan urbanism have been largely descriptive, rarely analytical or interpretive (e.g. Hutchinson 1950; Branigan 1972, 2001; van Effenterre 1980, 1990; Poursat 1988; Whitelaw 2001a; Shaw 2003; Schoep 2002b, 2004; see also chapter 15). More often, individual features are considered, such as palaces, villas, houses, courts, shrines, or streets (e.g. Graham 1962; Cadogan 1976; Driessen, Schoep, and R. Laffineur 2002; Betancourt and Marinatos 1997; McEnroe 1982; Palyvou 2002; Driessen 2002, 2009; Warren 1994; Chryssoulaki 1990; Hood 1977). I think it will be useful to step back from the detail of the Cretan data, and look at the question more comparatively (see chapter 15).

The ongoing debates about Roman urbanism, able to draw on patchy but sometimes rich written records (e.g. Alston 2002; Bagnall 1992; Bagnall and Frier 2006; Scheidel and Friesen 2009; Erdkamp 2001, 2015; Bowman and Wilson 2011), as well as abundant and highly standardized archaeological evidence, provide many points of tangency for Aegean prehistory, not least because of the comparable local and regional environmental contexts, fundamentally agrarian economies, and broadly comparable productive and transport technologies. On the other hand, the scale and the economic, social, and political structures of the societies were very different, so no direct analogies can be assumed. But the insights derived from a systematic and explicitly materialist and institutional perspective (Scheidel 2012; Scheidel, Morris, and Saller 2007; Erdkamp 2012; Morris 2004; Lo Cascio 2006), inspired by the New Institutional Economics (North 1981), have been amply demonstrated. This recent research has suggested the approach I want to tentatively start to explore in the remainder of this chapter. The basic assumption is that the fundamental institutional structures of society are integrally linked to, and will be embodied in, the nature and characteristics of the focal population centres, the urban infrastructure, and manifest in the material components of the city and how they are articulated with each other, both within the city and beyond to other communities within the wider polity.

I am therefore putting centre stage the major administrative institutions that are central to Bronze Age redistributive states: palaces and temples. On the one hand, these have long been central to our archaeological investigations of such societies, in earlier phases of research because they were explicitly sought out as the likely depositional locations of dense quantities of fine artefacts, elaborated architecture, and texts—so we have an over-representation of such evidence in the recovered and published archaeological record. While this bias of earlier archaeology is frequently decried, it should be productive to frame questions for which this abundant evidence is particularly suitable. On the other hand, that same material elaboration, architectural and artefactual, indicates an emic perception of the significance of such institutions. We also benefit from these past research biases, if we shift attention to textual records to gain social, economic, and ideological contextual detail to complement our understanding of the material record, with the bulk of those texts concerning the administrative workings of such institutions. This is also the case in the prehistoric Aegean, though we are severely handicapped by the limited number of textual records and also because texts were used almost exclusively for narrowly defined administrative records, thus restricting what they can inform us about. We are also limited in that the Cretan Linear A and Hieroglyphic records remain undeciphered, though the format of records and continuity of some signs from Linear A to Linear B does allow us to extract considerable information from the Linear A texts (Schoep 2002a).

From this perspective, to the degree that institutional roles and organization are integral to understanding urban form and structure, my expectation is that we can draw upon the far better documented urban institutional infrastructure of East Mediterranean and Near Eastern Bronze Age societies to help us understand the less thoroughly documented Cretan examples. Of course we have done this to some degree since the start of Minoan archaeology, but we have done so in very vague ways, either evoking some sort of assumed generic model or selecting individual characteristics out of context, asserting comparability and assuming significance. We have also been caught, from the start of

Minoan archaeology, in a desire on the one hand to derive Minoan cultural institutions and behaviours from East Mediterranean models, relying on diffusionary assumptions, while at the same time trying to define a Minoan exceptionality, going back to early twentieth-century Orientalism, for 'Europe's first civilization' (Hamilakis and Momigliano 2006).

Bronze Age institution-centred polities across the East Mediterranean and Near East are extremely variable. This is a problem if we are hoping for easy comparisons. But this diversity, which is patterned, should provide us with a spectrum of potential models which we can explore to understand individual institutions, in context, and their material manifestations. A major difficulty, however, is that this fundamental comparative analysis has not yet been done in these core regions. So this can only be an extremely preliminary exploration. Its aim is first to identify whether the available evidence indicates that Bronze Age Cretan societies, particularly as assessed through their material urban characteristics, fit within the range of such characteristics of urban societies further east, to establish that such a comparative exploration is worth developing further. In other words, can systematic comparisons potentially be a basis for developing relevant models for helping us to analyse and interpret Bronze Age Aegean urbanism? The secondary aim is simply to highlight some similarities and differences which, even looked at in such a broad-brush fashion, could identify interesting, even provocative, characteristics of Minoan urbanism.

Considering the primary aim, there are several fundamental points that hold out promise. Most East Mediterranean and Near Eastern polities were basically city-states, of various scales, but with a single major administrative and population centre. These were periodically amalgamated into larger territorial states or empires, particularly in Mesopotamia, but these larger polities were inherently unstable, regularly breaking down into their constituent building blocks: individual cities and their immediate territories (Marcus 1998; Garfinkle 2013; Stone 1997). For our analytical purposes, such component city-states usually retain their own administrative, economic, and social structures, with an additional higher hierarchical level imposing taxation or tribute, but often leaving local structures relatively intact. Occasionally, larger political formations are able to develop greater integration, more organic solidarity, and can be sustained for longer periods: this tends to characterize the larger-scale empires of the end of the Late Bronze Age into the Iron Age (Liverani 2005a; Diakonoff 1982; Barjamovic 2013). Perhaps linked to its high-volume and integrating interactions along the Nile, Egypt was able to sustain such larger-scale integration for long periods, but still occasionally broke down into smaller regional polities. The important point is that for a long period, across a range of different ecological contexts, cities and their immediate hinterlands were the fundamental political units, providing us with a wealth of examples to look for patterns among.

While it was asserted some time ago that Aegean urban communities were significantly smaller than their eastern counterparts (Renfrew 1972: 240–4), this was clearly not the case (Whitelaw 2001a). Scale was identified at the start of this chapter as a crucial dimension for understanding urban communities, so it is relevant that the major Aegean urban centres are comparable to those in other Bronze Age contexts. Significantly larger urban centres certainly existed, but these were exceptional, tending to be the capitals of larger territorial states and empires, and are almost invariably dependent on riverine or coastal locations to be sustainable.

Throughout the period and region, urban communities were fundamentally agrarian. While pastoral groups constituted more or less significant components of such polities, at different times and places, the cities themselves were principally sustained by local agriculture. This imposes constraints on the size and complexity of populations, through limits on agricultural productivity, surplus production, and the logistics of moving bulk agricultural resources from producers to consumers (Wilkinson 1994). There were variations in constraints depending on the technology and availability of forms of agricultural intensification (e.g. crop and animal species, irrigation, terracing), but within broad constraints principally determined by access to land, water, and labour. The technology available for agriculture was driven by human and animal labour, and logistically limited by animal and cart transport, except where bulk transport was possible by river or coastal shipping. These constraints allow us to anticipate significant logistical differences in potential developments between major regions (the Nile, southern vs northern Mesopotamia and inland Syria, the coastal Levant), but also major commonalities within and between such regions.

Throughout the Bronze Age, extending back into the later Chalcolithic in some regions and forward into the Iron Age in many, the polities were economically centralized, administered by major institutions, which were major landowners, and also often controlled considerable quantities of labour (human and animal). These were classic redistributive economies, though how centralized, and how exclusively redistributive, varied in time and space (Renger 1979, 1990, 1994, 2007; Liverani 2005b). But such control and redistribution were essential to the support of the major institutions at the core of society, whether palace or temple. Although the redistributive model of Aegean polities (Renfrew 1972; Killen 1985) has received much criticism and retuning in recent decades (e.g. Halstead 1999; Voutsaki and Killen 2001; Killen 2008; Pullen 2010; Nakassis, Parkinson, and Galaty 2011; Parkinson, Nakassis, and Galaty 2013), the scale of rations recorded in both Linear A and Linear B archives indicates redistribution was very significant in the economy (Halstead 2011; Bennet and Halstead 2014).

Together, these basic shared characteristics suggest the value of an explicitly comparative exploration. In addition, the wide range of different configurations, different scales, and differentially centralized political systems provides a rich source of interpretive models. But in contrast to the Aegean, many of these eastern cities and polities represent far better controlled contexts, known to some degree through documentary sources. Together, the material and textual records provide a range of contexts to explore and try to understand the nature of the similarities and differences.

7.4. BRONZE AGE INSTITUTION-CENTRED URBAN SOCIETIES

While broadly characterized as highly centralized, redistributive societies, power and control over land, people, and other resources was usually distributed across different institutions, while independent households of various scales usually existed outside the major institutions (Garfinkle 2005; Goddeeris 2007; Liverani 2013; Renger 1979; van Driel 2000; Stein 2005; Ur 2014). The latter, in particular, have been relatively ignored by earlier investigations because textual records were less necessary, and therefore less regularly used, deposited, or recovered in smaller-scale establishments. The interrelationships between different institutions are often only poorly documented, since the surviving records are largely internal accounts, primarily concerned with the administrative workings of an individual institution. Even when recovered systematically from coherent archives, sets of interrelated tablets are usually only partially preserved. In addition, complementary records from different, even roughly contemporary institutions are rarely preserved, so cannot be played off against each other very effectively to appreciate the complementary roles of and relations between different institutions within the same city or polity. With such patchy recovery, individual well-preserved and published archives will naturally be extrapolated to what are assumed to be comparable institutions, quite widely in time and space. Finally, with such patchy records the local meanings of terms and procedures are often reconstructed by analogy with documents from other sites, almost certainly blurring actual differences in practices. These cautions are not an argument against comparison and generalization, but simply suggest that for our purposes it is more productive to focus on broad structural parallels in how such institutions worked, rather than local and idiosyncratic details.

Three different types of institutions are regularly identifiable as involved in urban organization: the palace of the ruler; temples; and an assembly, whose composition is unspecified but is usually assumed to be some set of citizens, elders, or prominent families (Garfinkle 2005; Liverani 2013; Stein 2005; Otto 2012; Yoffee 2016). The first two tend to be most thoroughly documented, embodied in substantial recognizable structures and with the best chance of having and preserving archives. The assembly is usually only referenced in legal documents or literature, rather than as a corporate and physically manifest institution, so unsurprisingly, the first two dominate the archaeological as well as text-based records and analyses. The relative importance of these foci for power varies in time and space, though there are very broad patterns. Generally, the temples seem to have had more power and independence early, in the Late Chalcolithic and earlier Bronze Age, with individual temples subsumed within palatial power structures through time (Diakonoff 1969, 1982; Postgate 1992: 299–301). While losing independence, in later periods early temples were often restored or rebuilt as expressions of palatial political power, so what they represent in terms of power structures shifts. Geographically, temples physically decline in scale from east to west until they are simply small shrines in Crete and the Aegean, and there is little evidence that they independently controlled major economic resources in Levantine or Aegean polities. Egypt provides a different picture, with temples directly associated with divine kings through the Pharaonic period.

The palace as an institution is usually discussed as a unitary phenomenon, but it is clear in many cases, both textually and archaeologically, that a city could have multiple royal palaces. Some were functionally differentiated, designed as venues for specific types of activities, but others were attached to individuals: the king, individual queens, the mother or brothers of the king, the crown prince, etc. Rarely is it clear, either archaeologically or through textual references, what degree of independence or importance a specific palace had amongst its contemporaries, but this was undoubtedly variable, depending not only on the local system but also on the power of the individuals involved at any point in time. Should these be treated as manifestations of a single source of power, different facets of the same, or as quasi-independent power centres? In many cases, independent of the status and official roles of the individual they represented, it is clear from accounts that they acted as economic establishments, with their own personnel, dependants, labourers, and resources (including agricultural estates). The ruler of a polity will in some cases also have had palace establishments in subsidiary centres within the polity, even if management of that centre and its hinterland was to a degree devolved to a local ruler or governor. In some cases, regular circulation of the ruler among these subsidiary centres and the performance of specific ceremonies, sacred or secular, was integral to the maintenance of regional integration.

Short of texts detailing these relationships, it is difficult to see how these subtle power relations would be clearly manifest archaeologically. In an Aegean context, elaborate palaces at nearby Mycenae and Tiryns do not require that we consider these independent polities, and it is equally impossible to assert whether that at Tiryns represents a palace of the ruler of

Mycenae in a secondary (port) community, or the palace of a subsidiary local ruler/administrator. An even more complicated situation is represented by the multiple palaces partially excavated at Ras Ibn Hani, the nearby port of Ugarit, though in this case, this was clearly a dependent subsidiary centre within the kingdom of Ugarit.

To a degree, some related questions apply to temples, of which a city might have multiple examples ranging from the major temple of the patron deity of the city to small neighbourhood shrines. Some were clearly major economic institutions (Fales 2013), though, unlike multiple royal palaces, each is likely to have had a considerable degree of autonomy, until eventually largely subsumed under palatial authority by the later Bronze Age. So in this case, these can usually be treated more straightforwardly as independent (and, to a degree, competing) institutions. While individual cities will have had temples/shrines to various deities, processions between the palace and individual temples/shrines could integrate the different institutions within the city, but also different locations within the polity. At least some major Mesopotamian and Syrian gods and goddesses were recognized to have a primary shrine, which might require pilgrimages, consultations, or dedications at temples in a different city or polity. So while we can consider individual temples and shrines as relatively independent, many were at least ritually linked, to each other and the palatial authority, and situated within networks within the city, the polity, and in some cases beyond.

While there are textual references to an assembly which might advise or be consulted by the ruler, or in specific cities actually be the central administrative authority, there are no distinctive material structures which can be clearly associated with such an institution (Otto 2012). The relevant individuals could simply have been participants in formal observances, but are not identifiable because they are not represented by a distinct material feature, such as the podia assumed to be for thrones, which are regularly recognized as a manifestation of individual authority.

In terms of distributed civic administration, there are also references in accounts of legal disputes to judges or magistrates, sometimes representing or active within segments of a community, representing some level of sub-urban organization. There is no suggestion that these had a material manifestation, so will be archaeologically invisible, unless, as in some Islamic cities, physical walls actually defined city quarters (Fox 1977; Novák 1999b; see Postgate 1983). Divisions based on conventions, propinquity to gates, canals, streets, or landmarks may have defined the spatial jurisdiction of such authorities (Stone 1991, 1995, 1997, 2013; Postgate 1992: 80–3).

The discussion so far has drawn very loosely on both textual and archaeological information, to consider some possibilities for exploring the major structuring institutions of the city. The richness and detail of the texts available—but also their extreme patchiness—has been noted. The archaeological record has the potential to provide a more comprehensive and representative database, so long as we explore and document it systematically. Ideally, we would be able to directly link the archaeological and textual records for specific institutions; in practice this is difficult. Many texts have no archaeological context, having been bought on the market. Even when excavated, the direct chronological correlation between the two datasets may be difficult to establish, with documents regularly retained as medium-term records, while sets were often discarded in later contexts. Stratigraphic records from early excavations are often minimal or problematic, and the contextual details will not have been published, even if originally recorded. Because major temples were often elaborated through time and restored repeatedly, often much later, it is also difficult to define their detailed histories. These same limitations apply when trying to assess the relative importance of different institutions within a city. It is extremely rare that we will have rich textual evidence from different institutions that we can consider even roughly contemporary. Archaeologically, the periods which can be defined ceramically are rarely less than a century (and usually rather more), and their correlation with text-defined historical phases or events depends on direct stratigraphical links or the assumption that archaeologically defined destructions relate to historically claimed conquests. So we need to adapt our expectations to phases rather than events or horizons, and constantly bear in mind this coarse resolution.

In considering texts and archaeology, we obviously play off detail against abundance, but the archaeological data has the potential to provide a far more representative sample, though still biased in its survival, recovery, and documentation. Archaeologically, for evidence like housing, we can explore extensive samples of houses to detect and contextualize patterns. But until very recently this has not been not a priority, which explains the tremendous recent focus on the few cases of early extensive explorations of housing, whether at Ur (Brusasco 1999–2000, 2007; Stone 1996; Battini-Villard 1999), Nuzi (Novák 1994, 1999a; Dosch 1996; Bracci 2008, 2009; Battini 2009, 2012; Mönninghoff 2014) or Amarna (Crocker 1985; Shaw 1985, 1992; Tietze 1985, 2010; Kemp 2012), increasingly being redressed by a range of projects (e.g. Pfalzner 2001; Otto 2006). An alternative has been period-specific comparative analyses of limited quantities of data documented across many sites (Battini-Villard 1999; Miglus 1999; McClellan 1997; Chiti 2015; Foucault-Forest 1996). For less abundant and more exceptional monuments, we need to work at the inter-site, comparative level, and quantification and comparison is necessary to understand the role and significance of such monuments and the institutions they represent (e.g. Margueron 1982; Heinrich 1982, 1984; Kempinski 1992). This may be relatively straightforward within a particular culture at a particular period of time, where we can expect that the same norms were recognized and values shared. But inter-cultural or inter-period comparisons would seem to be less justifiable, since different standards and expectations may have been culturally defined. On the other hand, much of the significance broadcast by the physical form of these institutions is in their monumentality, evident in the past as much as to us as analysts. Basically, it costs to build, in terms of materials, resources, capital, and labour, so monumentality is a manifestation of power, over people and resources (Trigger 1990; DeMarrais, Castillo, and Earle 1996; see also chapter 15). Those costs may have been evaluated differently in different cultures, but labour also has opportunity costs—what else could have been done with it. In primary production, agriculture, these are broadly standardized costs, because of the long-term stability of agricultural technology and logistics. This is why long-term and continent-wide patterns can be established by converting costs to human labour for staple production, calibrated against biologically based standard subsistence needs (Maddison 2007; Scheidel 2004; Lo Cascio and Malanima 2014; Kron 2011). I would push this one step further, and suggest that in addition to construction costs, the monuments themselves also provide an index of maintenance costs: so the scale of an institution should be a proxy for the support personnel needed to maintain it and sustain its functions (cf. Davies 2004; Barjamovic 2011; Spence 2007).

This perspective has a further simplifying implication, since in investigating major monuments in this study region we are primarily looking at two distinct forms of institutions—palaces and temples. Archaeologically, we can often distinguish these, based on the degree to which they are standardized in distinct ways within a culture and have repeated features which align with our often intuitive assumptions of how such institutions work. In practice it can be difficult to distinguish them, since so many features are shared by common practices involving controlling, impressing or intimidating groups of people, the architectural facilitation of distinctions in activities and circulation patterns between institutional personnel and visitors (insiders and outsiders), common needs for storage, and a common vocabulary of architectural elaboration. The distinction can be particularly difficult if structures are only poorly preserved or partially excavated. There are also crossovers and hybrids, for example in palatial residences of the priestly elite associated with a temple (e.g. Ur), temples associated with royal cults within Syrian palaces (e.g. Mari), or palaces incorporated into mortuary temple complexes in Egypt.

We can expect multiple examples of both types of institutions in many cities, and because of labour costs in construction, maintenance, and sustaining daily activities, we can anticipate these will scale, with more important institutions, controlling more resources, being larger. At the lower end, we can expect small palaces may overlap with the largest houses of the non-royal elite, as seen with the eventual identification of the South Palace at Ugarit as the residence of an important merchant, who also served as the kingdom's vizier (Yon 2006). There need not be any significant break along such a scale, with institutional offices often held by members of elite households. We can expect similar scaling among the range of religious institutions within a city. While we might anticipate different rules guiding the construction and elaboration for each type of institution, they will share common cultural expectations for the expression of status, and a vocabulary expressed through architectural elaboration; so we can expect a degree of comparability justifying material comparisons. This will be particularly important in evaluating the organizational significance of different institutions within a city. While an assessment of investment, in materials or labour, would best be done with full information on three-dimensional wall volumes (e.g. Devolder 2013; see also chapter 4), the ambiguities involved in reconstructing monumental structures from their foundations introduce considerable uncertainties, so for a first approximation simple plan areas will be used here, allowing very rough comparisons.

This should enable an approach to urban institutions through a very broad-brush cross-cultural analysis, allowing us to assess the relative significance of monuments, and the institutions they represent, on the basis of architectural scale. It will also allow us to exploit our long-term investigative bias on temples and palaces productively. Obviously, different cultures, polities, institutions, and the individuals making the relevant decisions will vary enormously in how they decide to allocate their resources, but this is at least a starting point to think comparatively about the relative importance of individual institutions within ancient urban centres. The question is whether similar institutions are central to urban organization in the Aegean and Crete, and if so, whether we can draw on the better-documented understanding of such institutions elsewhere to help us to understand their roles and relative significance. The focus of this very preliminary exploration is therefore to make very roughly quantified comparisons of a limited range of characteristics drawn from an accessible sample of East Mediterranean and Near Eastern Bronze Age cities (Fig. 7.11; Table 7.1), to see whether the Cretan evidence sits within that broad range and thus to establish whether further, more detailed comparisons will be relevant and might be helpful in investigating the nature of Minoan and Aegean urbanism. The sample analysed is opportunistic rather than representative, to include sites across the study area—a few from the late Chalcolithic but principally spread through the Bronze Age. To include sites with palaces and temples, the focus has been on more extensively investigated sites: this also biases the sample toward large sites, appropriate since the purpose is to ascertain whether Aegean urban communities fit within the range of behaviours documented for eastern cities. Seventy-eight sites are considered, which provide information on 119 palaces and 147 temples and shrines. The sites are located in Figure 7.11 and listed in Table 7.1.

For the remainder of this preliminary exploration, I will focus on two basic characteristics of urban centres (overall scale and population differentiation),

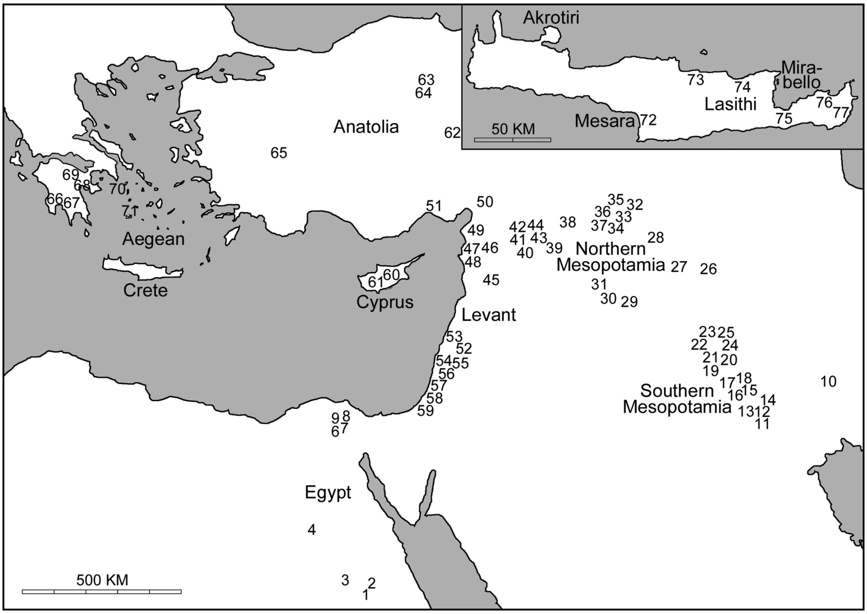

Fig. 7.11. East Mediterranean and Near East with sites analysed (main map); detail of Crete with sites and surveys analysed (inset).

Table 7.1. Sites analysed.

No.	Modern name	Ancient name	Region
1	Malkata		Egypt
2	Deir El-Ballas		Egypt
3	South Abydos	Wah Sut	Egypt
4	Amarna	Aketaten	Egypt
5	Memphis	Inbu-Hedj	Egypt
6	Tell Bastis	Bubastis	Egypt
7	Tell el-Dab'a	Avaris/Peru-nefer	Egypt
8	Tanis	Tanis	Egypt
9	Mendes	Per-Banebdjedet	Egypt
10	Choga Zanbil	Dur Untash	Iran
11	Tell el-Muqayyar	Ur	South Mesopotamia
12	Tell es-Senkereh	Larsa	South Mesopotamia
13	Warka	Uruk	South Mesopotamia
14	Tello	Girsu	South Mesopotamia
15	Tell Bismaya	Adab	South Mesopotamia
16	Isan al-Bahrijat	Isin	South Mesopotamia
17	Nuffar	Nippur	South Mesopotamia
18	Tell Abu Duwari	Mashkan-shapir	South Mesopotamia
19	El-Okheimer	Kish	South Mesopotamia
20	Jemdat Nasr		South Mesopotamia
21	Tell Ishchali	Neribtum	South Mesopotamia
22	Tell Abu Harmal	Shaduppum	South Mesopotamia
23	Tell Khafajah	Tutub	South Mesopotamia
24	Tell Agrab		South Mesopotamia

25	Tell Asmar	Eshnunna	South Mesopotamia
26	Yorgan Tepe	Nuzi	South Mesopotamia
27	Qal'at Sirqat	Assur	South Mesopotamia
28	Tell al-Rimah	Karana	South Mesopotamia
29	Khirbet Ed-Diniye	Haradum	North Mesopotamia
30	Tell Hariri	Mari	North Mesopotamia
31	Tell Ashara	Terqa	North Mesopotamia
32	Tell Leilan	Shubat Enlil	North Mesopotamia
33	Tell al-Hamidiya	Ta'idu	South Mesopotamia
34	Tell Brak	Nagar	North Mesopotamia
35	Tell Mozan	Urkesh	North Mesopotamia
36	Chagar Bazar	Asnakkum	North Mesopotamia
37	Tell Beydar	Nabada	North Mesopotamia
38	Tell Chuera	Harbe	North Mesopotamia
39	Tell Bi'a	Tuttul	Inland Syria
40	Tell Meskine	Emar	Inland Syria
41	Halawa A		Inland Syria
41	Halawa B		Inland Syria
42	Tell es-Sweyhat		Inland Syria
43	Tell Munbaqa	Ekalte	North Mesopotamia
44	Tell Bazi		North Mesopotamia
45	Tell el-Mishrifeh	Qatna	Inland Syria
46	Tell Mardikh	Ebla	Inland Syria
47	Ras Shamra	Ugarit	Levant
48	Ras Ibn Hani	Apu?	Levant
49	Tell Atchana	Alalakh	Levant
50	Tilmen Höyük		Anatolia
51	Tarsus	Tarsa	Anatolia
52	Tell el-Qedah	Hazor	Levant
53	Tel Kabri	Rehov?	Levant
54	Tell al-Mutesellim	Megiddo	Levant
55	Beit She'an		Levant
56	Tell Balata	Shechem	Levant
57	Tell Aphek	Aphik	Levant
58	Tell ed-Duweir	Lachish	Levant
59	Tell al-Ajjul	Sharuhen?	Levant
60	Ayios Dimitrios		Cyprus
61	Maroni		Cyprus
62	Kültepe	Kanesh	Anatolia
63	Alaca Höyük		Anatolia
64	Boğazköy	Hattusa	Anatolia
65	Beycesultan		Anatolia
66	Ano Englianos	Pu-ro	Greece
67	Menelaion		Greece
68	Tiryns	Tirynthos	Greece
69	Mycenae	Mykenae	Greece
70	Ayia Irini		Cyclades
71	Phylakopi		Cyclades
72	Phaistos	Pa-i-to	Crete
73	Knossos	Knossos	Crete
74	Mallia		Crete
75	Gournia		Crete
76	Petras		Crete
77	Zakros		Crete

two principal types of institutions (palaces and temples), and finally consider spatial layout.

7.5. URBAN SCALE AND DEMOGRAPHY

Populations aggregate for various reasons, voluntarily to assist cooperation, or involuntarily to facilitate control and administration by others. The frequency of fortifications around early urban centres highlights one particular rationale for nucleation and cooperation. The overall distribution of settlement sizes can provide some insight into the dominant decisions determining a specific settlement pattern. The agricultural carrying capacity of a landscape, in terms of soils, water availability, crops, and agricultural and transport technologies will put upper limits on the population that can be supported. Production intensity and transport technologies will constrain the maximum size of cities, in terms of what concentration of population can be supported from local resources. This will vary across the vast study region, with particular distinctions between sub-regions such as southern Mesopotamia and the Nile valley, where intensive irrigation or flood water agriculture can be practised, and most other regions, limited to rain-fed agriculture. While the sample studied here is not representative of city size, this regional difference in scale of the larger cities can be seen when the sample is divided by broad region (Fig. 7.12; compare with more representative samples from survey data in Fig. 7.9).

Southern Mesopotamia and Egypt also stand out because of the ease of bulk transport by river or canal. But for most regions, beyond about a 5 km radius of a city, transport costs, for farmers commuting to their fields or bringing bulk agricultural products to the city, put serious constraints on agricultural productivity (Chisholm 1968; Wilkinson 1994; Whitelaw forthcoming B). These encourage a regular spacing of agricultural communities so they are not competing for the same territory, but also put limits on viable self-sustaining city size. While subject to local conditions and agricultural strategies, across this region and under different regimes, non-mechanized agricultural production generally requires on the order of 0.5–1.0 ha of cultivated land per person. A notional 5 km radius of fields from the city, suggests city residential population limits on the order of 8,000–16,000 individuals.

To convert these constraints into archaeological expectations, we need estimates of city occupation density. These vary considerably, with different cultural concepts of crowding, with the scale of the community, and the range of activities conducted within the household, as opposed to outside the city among the fields. The latter two interact, with households generally larger in

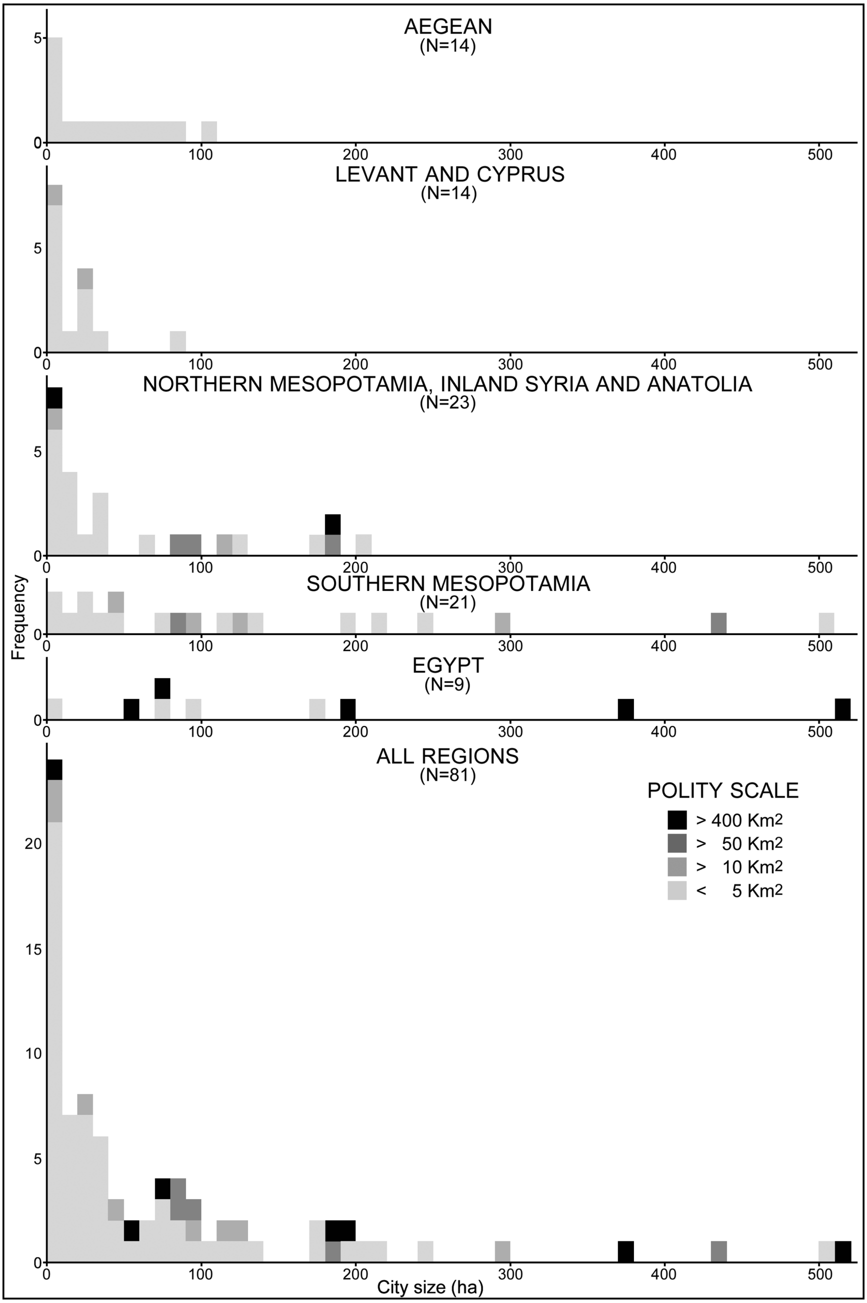

Fig. 7.12. City size by region and estimated polity extent (polity sizes are in thousands of km²).

rural communities, where a wider range of agricultural processing activities may take place within the household, often in larger courtyard spaces, and animals may also be brought into the yard. Urban space is usually more crowded, with expansion limited by fortification walls, or intensively cultivated, highly valued gardens immediately surrounding the city. Archaeological estimates are often based on ethnographic data from the same region, though this rarely considers the actual relevance of such analogies. More appropriate estimates can be made based on excavated areas of ancient housing, though this requires information on or estimates of household and family size. These can sometimes be based on textual records or general demographic analogies from other pre-industrial contexts (e.g. Bagnall and Frier 2006; Frier 2000; Scheidel 2001; Schloen 2001). Across this region, urban occupation density estimates, derived through different arguments, are rarely lower than 150 persons/ha or above 400 persons/ha. Taking these extremes provides non-controversial brackets: at 150/ha, our maximum estimates of 8,000–16,000 individuals would produce expected maximum city sizes of 50–100 ha, at 400/ha, 20–40 ha. Not surprisingly, very few Bronze Age cities exceed these limits (Fig. 7.9). With occupation densities in the 200–250 persons/ha range (Whitelaw 2001a), the major Minoan sites are pushing—or in the case of Knossos (at 100 ha) probably well beyond—this limit, almost certainly creating provisioning problems (Whitelaw forthcoming B).

A second point, touched on in section 7.1, concerns the distribution of settlement sizes. Regional survey techniques, particularly the extensive strategies used in the early decades of such research, systematically overlooked smaller and, in the Near East, non-mound sites. This is now being rectified, with both pedestrian surveys and satellite imagery, which is increasingly being used to reassess and complement earlier ground surveys (e.g. Casana and Cothren 2013; Bonacossi and Iamoni 2015). But even using the large-scale early surveys, Adams (1981) was able to point to significantly different settlement size distributions in Mesopotamia in periods characterized by many independent city states, and those in which the region was subsumed within larger empires. The latter phases were strongly dominated by small sites, a more effective distribution of population for efficient agricultural production. A second gloss on these contrasts would emphasize settlement nucleation in the competitive environment of endemic raiding or warfare among city states, and the impact in terms of settlement dispersion, of pacification within a large territorial state or empire. But as noted in section 7.2, the settlement patterns of Bronze Age institution-focused polities are intriguingly characterized by hollowed-out settlement hierarchies: the urban centres that are the focus of city states, and much smaller villages and hamlets, but very few of the intermediate towns which we would expect for a well-developed settlement hierarchy. This emphasizes that settlement patterns are the result of explicit strategies, not in any sense ‘natural’, and so should be able to inform us about the economic and political structuring of society. The classic central place models were developed to analyse large, modern systems within unified states, with regional spatial behaviour dominated by economic costs. Early, much smaller political systems, while not independent of logistical constraints, may be more significantly affected by administrative and political concerns. In this case, the polarized distributions suggest the strongly centralized power of these administrative institutions, and, justifying this whole investigation, the centrality of cities and city-life in these cultures. Adams's analysis also provides strong advocacy for the approach suggested here, exploring the material characteristics of well-documented Near Eastern contexts to develop empirically based models of economic and political landscapes, in systems organized in ways largely alien to our own and best documented experience.

As a final perspective on urban scale, in agrarian states the population will be supported by the agricultural production of the entire polity, with an urban population potentially supported through the import of resources from beyond its immediate vicinity, channelled up the settlement hierarchy. Given the logistical costs, such resource support may be transferred through taxes or tribute in the form of lower bulk/higher value raw materials or finished goods—wealth rather than staple finance (d'Altroy and Earle 1985), but the necessary subsistence resources will still have to be acquired, with the associated logistical costs. Despite high expectations based on the quality rather than quantity of fine crafted goods in palatial Crete, even in the Roman Empire urban economies were primarily agricultural (Erdkamp 2015; cf. London 1992). So a polity's population should relate fairly directly to the area under cultivation, and we should expect a generally linear relationship between population (represented by total settlement occupied area) and a polity's agricultural territory. Documenting such a relationship will be complicated archaeologically by the incompleteness of our settlement samples, by uncertainties about the percentage of territory which was cultivated in the period of interest, and by subsidiary consuming centres in larger polities (Fig. 7.13). But the interest in even gross approximations is that deviations from such a simple expected relationship can point to exceptional situations, for example, when polities or specific capital cities are significantly sustained by extra-territorial tribute (e.g. Brumfiel 1976; Steponaitis 1981; Wright 2000), or commercial relations—for example the few anomalous mega-cities of antiquity known historically (cf. Clark and Lepetit 1996; Ringrose 1998). The decline in site numbers (though representing lesser declines in regional populations) between the Protopalatial and Neopalatial periods, monitored by survey data (Fig. 7.3), may hint at some changes in productive and political relations between sub-regions on Crete, but this will require detailed systematic analysis to explore effectively.

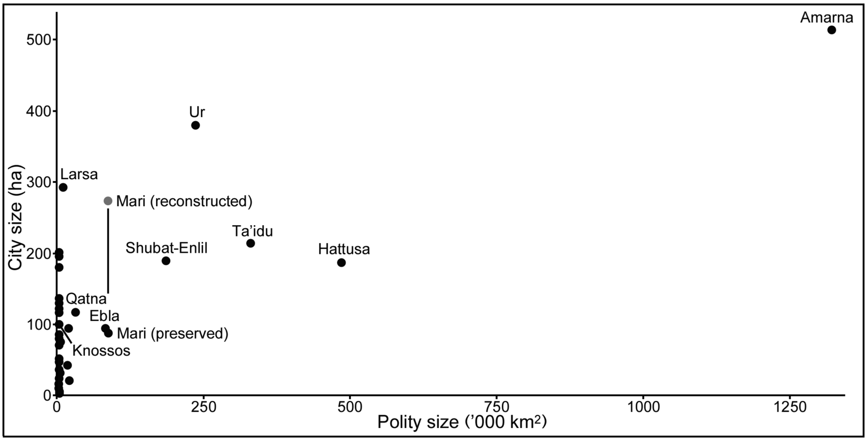

Fig. 7.13. City size in relation to estimated polity extent.

7.6. URBAN CENTRALIZATION AND DIFFERENTIATION

Urban centres represent centralized populations, and they are characterized by differentiated populations, as outlined in sections 7.1 and 7.2. While we may take this as assumed, we will want to know how this is manifest in the communities of interest, and what this tells us about them. In what ways did the residents, or the relative mix of residents, in urban communities differ from those of smaller associated rural communities? In what ways did this contribute to a distinct character for urban populations? Unfortunately, the textual data that explicitly informs on these questions is relatively restricted, because of the largely institutional contexts and contents of the texts. In limited examples, texts recovered from household contexts can inform us about the nature, occupations, and activities of members of individual households (e.g. Ur: Brusasco 1999–2000, 2007; Nuzi: Bracci 2008, 2009; Ugarit: van Soldt 2000; Yon 2006). In other cases, census and taxation records can give us overviews of population composition and demographic characteristics (e.g. Heltzer 1976, 1982; von Dassow 2008; Schloen 2001), which permit reconstruction of family forms and the relative frequency of broad occupational categories. Roman, medieval, and other pre-industrial censuses may provide more detailed models on which to develop expectations (e.g. Bagnall and Frier 2006; Scheidel 2001; Cipolla 1993; De Vries 1984; Luis de Rojas 2012), including differences between communities of different scales and even different census districts of a city (Alston 2002).

Drawing upon a range of data from pre-industrial contexts, in most agrarian-based urban societies some 5–20 per cent of the overall population is not engaged in primary agricultural production, either as elites, crafters, merchants, or providing services (Whitelaw forthcoming B). These non-agricultural occupations and statuses will be preferentially concentrated in the urban centres with their central-place administrative functions, accounting for the much greater differentiation of urban populations.

Focusing on the urban residents, in what way were they differentiated and how were they organized within the city? In some cases, some institutional personnel were actually housed in the institutions, suggested for example for modular room-sets in some Egyptian temple compounds (Lacovara 1997). In other cases (e.g. Ur: Mallowan, Mitchell, and Woolley 1976; Nippur: Stone 1987), documents in excavated houses suggest priestly neighbourhoods outside the temples. Evidence for some clustering of crafts, particularly pyrotechnical, has been produced by the surface surveys of a few sites (Stone and Zimansky 2004; Tosi 1984), while the balance of different craft production evidence varies in different excavated areas at Amarna (Shaw 1985). But a crucial problem is archaeological recognition, since few crafts have distinctive associated production facilities (hence the preferential recognition of pyrotechnological crafts), and until recently archaeological recovery, through excavation or survey, was not detailed enough to document craft production debris. Modern sectorial models of commerce and industry, which can be traced back to at least the medieval period in Europe (Carter 1983; De Vries 1984), are based on the logistics of specialized production and economies of scale, and reinforced by social structures embodied in guilds or castes. These may have limited parallels in institutional workshops, but comparable organizations of independent crafters are not documented in our study area, except to the degree that some associations of traders had a measure of organizational autonomy for harbour or trading quarters. In commercialised civic environments such as some Roman cities, spatial patterns are readily recognized relative to access routes and fora (Laurence 2007; Poehler, Flohr, and Cole 2011; Laurence and Newsome 2011). Whether these have any relevance to less commercialized Bronze Age cities needs to be established, not assumed.

For independent residents, we might anticipate variations in wealth, but also in the scale of family, lineage, or other kinship-based associations, potentially reinforced by residential propinquity. House size provides one index of variation between households, though as noted in section 7.2, different cultures will have different concepts of crowding and organize their activities in space in different ways. However, in the same way that architectural elaboration for major institutions should provide a scale of relative wealth and power because of the common costs of materials, resources, and labour, domestic house size should scale with wealth,

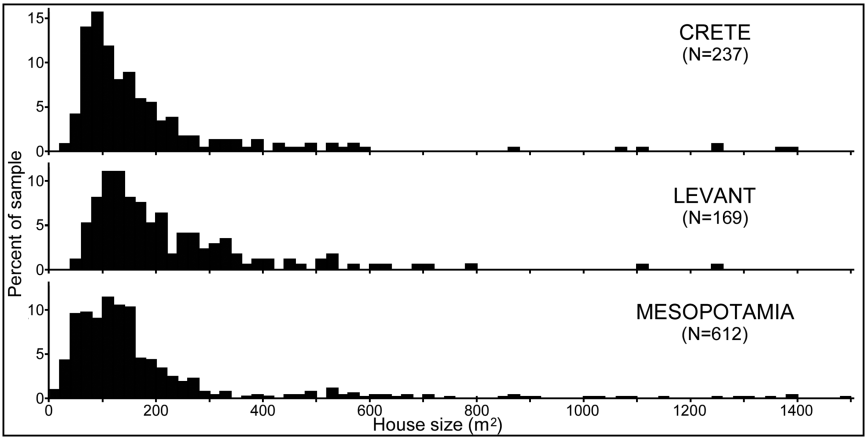

Fig. 7.14. House size distributions by region: Crete (top); Levant (centre); Mesopotamia (bottom).

particularly within the same culture, but at a gross level, also interculturally, and house size has been used as a cross-cultural index of per capita wealth (Morris 2004).

The distribution of house sizes within individual sites, where there is an extensive sample, or groups of contemporary sites within a region inevitably follows an exponential distribution, comparable to that documented for Neopalatial Crete (Fig. 7.14). This shape of curve also characterizes wealth distributions for limited Roman data (Scheidel and Friesen 2009; Bagnall 1992), and medieval European cities (Cipolla 1993). From Sjoberg (1960), we might expect concentric residential zonation by wealth or class, with wealthier residents clustered near the centres of cities and poorer ones near the peripheries. There are relatively few cases where we can assess this, but the extensive excavations at sites such as Amarna and Ugarit document a thorough mixing of large and small houses in most parts of the city. While we cannot usually document the relationships between residents in adjacent houses, Kemp (2012) has argued at Amarna for a pattern of 'urban villages', essentially micro-communities within the city, structured around patronage relationships, with elite establishments surrounded by those of affiliated dependents. At Nippur, Stone (1987) has identified both localized kin groups and a priestly (occupationally defined) quarter. In contrast, at Chuera, houses within the inner fortification of the old city tend to be smaller than those located in the outer city (Pfalzner 2001; Chiti 2015). This may simply be the long-term result of crowding and house sub-divisions (Stone 1996) within longer-occupied areas of the city, but may also represent a contrast between institutionally dependent vs more independent families (Tamm 2014). In Roman contexts, some spatial differences in house size, material consumption, and wealth/status can be recognized, yielding broad patterns within the city, but also arguably modified by patronage relations linking adjacent large and small houses in the same blocks (Wallace-Hadrill 1994).

In the Minoan context, plotting house sizes at palatial sites, some clustering of larger houses near the palaces and main access routes can be detected (Whitelaw 2001a; see also chapter 15), though we must also recognize excavation biases working out from the palatial foci, whereby larger houses or those with more elaborate facades tended to be preferentially excavated or documented in more detail (e.g. at Knossos, Malia, Zakros, Palaikastro). The largest urban establishments bear comparison with a small number of large rural villas (Whitelaw 2001a), where the extra floor area tends to be devoted to exceptional storage (Christakis 2008). Quartier Mu was mentioned in section 7.2, along with probably comparable establishments at Protopalatial Malia. Mu, the most thoroughly and extensively investigated, is immediately surrounded by what appear to be attached workshops (Poursat 1996), recalling Kemp's model for Amarna (2012). This complex compares in scale with the Neopalatial Little Palace at Knossos, Quartier Epsilon at Malia, and the small palaces central to sites such as Gournia and Petras (Fig. 7.6). This last comparison should give an idea of the economic and social importance of these individual components of the urban landscape.

Schoep has taken these institutions as evidence for some form of heterarchical organization of Minoan polities (2002b, 2006). While this seems proposed as an alternative to an hierarchical structure, the concept of heterarchy was designed to draw attention to non-hierarchical, cross-cutting integration within hierarchically structured societies, not positing an alternative structure (Crumley 1995). In fact, the original heterarchical model appears potentially relevant for thinking about the interconnections and variable dynamics which would have been necessary to integrate multiple palace and temple institutions, as well as elite families and a quasi-independent assembly, in Near Eastern Bronze Age cities. In this context, urban establishments such as Mu fit comfortably within Near Eastern and Levantine patterns which entail multiple institutions of different types and varying scales within a city, and require no new and otherwise undocumented formulations. Indeed, with rulers having palaces within subsidiary cities as well as the central city of their polity, the existence of palaces at both major and minor Minoan centres is not necessarily an argument for the political independence of each such community. While it seems extremely improbable that the island was politically united from the start of the palatial period (Whitelaw 2012, forthcoming A), incorporation of formerly independent polities into an expanding Knossian polity would require a continuing administrative presence within the now secondary, local administrative centres.

7.7. INSTITUTIONS

7.7.1. Palaces

Palaces are characterized by their monumental construction and usually formalized layout (Margueron 1982; Heinrich 1984; Al-Khalesi 1975). They may incorporate larger-scale versions of components of domestic houses (residential quarters, kitchens, bathrooms), but will also have many other components which indicate their distinct, larger-scale, more public and interactive/performative roles (reception rooms, courts, large-scale kitchens), and may have extra-domestic, functionally specific quarters (storage, workshops, archives, ritual), which may be included within the palatial structure or closely associated, though other such facilities may be distributed outside the palace itself. The activities documented directly by specialized spaces within the palace structure/compound will probably indicate a range of activities the palace is engaged in, but need not include all the activities in which it has a direct interest. Palaces are usually recognized because of standardized elements of their plan which are seen in cities even within other polities, indicating shared behavioural and organizational concepts and a common vocabulary of power and performance. This standardization obviously helps their archaeological recognition, but without systematic analysis in well understood contexts, the significance of variations in layout is unlikely to be obvious.

It was noted in section 7.4 that various sites document multiple palaces in roughly contemporary use, though exact synchronizations can be difficult to establish without site-wide destruction horizons. Similarly, without associated texts, it is difficult to determine the roles (duplicate or complementary) of each palace, or their users. Finally, excavations within any one city are not extensive enough to establish the total of such palaces, or potentially the full range of activities and investment and consumption of resources within the palatial sector. It may also be difficult to establish to what extent royal palaces are clearly distinct from the houses of the wealthiest other urban elite residents–would they have been clearly distinguishable to residents or visitors to the city, and were such distinctions important?

Palaces worldwide often share features related to their public functions and their multi-functional institutional roles (Evans and Pillsbury 2004; Nielsen 1999). In the region under study, there are many parallels between palaces and temples, due to common activities and shared cultural conventions and semiotic vocabulary. These standard non-verbal cues will, on the one hand, have projected a shared ideology, while also clearly distinguishing the palace from everyday domestic contexts. Some palatial characteristics may be reproduced in the houses of the elite, supporting claims of affiliation and status by the latter. Also cross-culturally, we should expect scale to translate into relative importance, in terms of resources and labour necessary to construct, maintain, and function (cf. Davies 2004). This should on the one hand allow intra- and inter-community comparisons, and a rough assignment of relative importance to different examples, as an index of the resources available to each institution. Ideally, as with city size, there should be a baseline relationship with the resources controlled by the institution, so we might anticipate that palace scale would be linked to city and ultimately polity size. But analytically, this will be difficult to assess, as accurate analysis would require knowing the full extent of the contemporary palaces managed by the city or polity rulers, and being able to distinguish these from other elite establishments.

Figure 7.15 graphs the area of individual palaces for the entire sample, and broken down by broad regions; the scale of each polity is also indicated. A general decrease in both maximum size and central tendency can be traced from south-east to north-west, from Egypt through southern Mesopotamia, northern Mesopotamia and the Levant, to the Aegean. Outside Egypt, with the exceptional resources of the New Kingdom, very few palaces extend over more than 1 ha. Unsurprisingly, the larger palaces are associated with the larger polities, though a few city states could support substantial palaces. But the major Minoan palaces are surprisingly large, particularly as focal administrative centres for relatively small states. Knossos is especially remarkable, since the palace footprint was established in the Protopalatial period, when Knossos only dominated its immediate hinterland, an area of hundreds, not even thousands of square kilometres.

Looking at the more immediate indicator of local resources, city size (Fig. 7.16), provides some provocative patterns. Again excepting Egyptian royal palaces, at the left a diagonal ceiling appears to define the limits of what a polity could sustain, with the peak represented by the palace of Naram-Sim at Mari, considered a wonder in its own time. The clear limit at 1.5–2.0 ha applies to polities of all scales, presumably with very variable resources. The actual scale of palatial establishments sustained by a polity will be masked by multiple palaces within the same city, here assessed independently, since contemporaneity can rarely be guaranteed, and no cities have been completely excavated. However this raises questions about such ceilings—was this the scale of individual institution (as an index for numbers of staff, rooms, and functions) that could be effectively integrated? For larger polities, some palaces will represent some duplication (establishments for specific elite individuals), but some (e.g. Ebla, Qatna, Beydar) suggest functional specialization, essentially distributed functionality. The exceptionality of the Cretan palaces, particularly of Knossos, also stands out. It is within the ceiling defined by Mari, but for a much smaller polity. It may be that all administrative functions in Cretan polities were concentrated within a single palace, though the Little Palace at Knossos (and any unknown equivalents) may represent some distributed functions. So in terms of palace scale, Crete is within the expectations of East Mediterranean and Near Eastern urbanism, but is, interestingly, pushing the boundary.

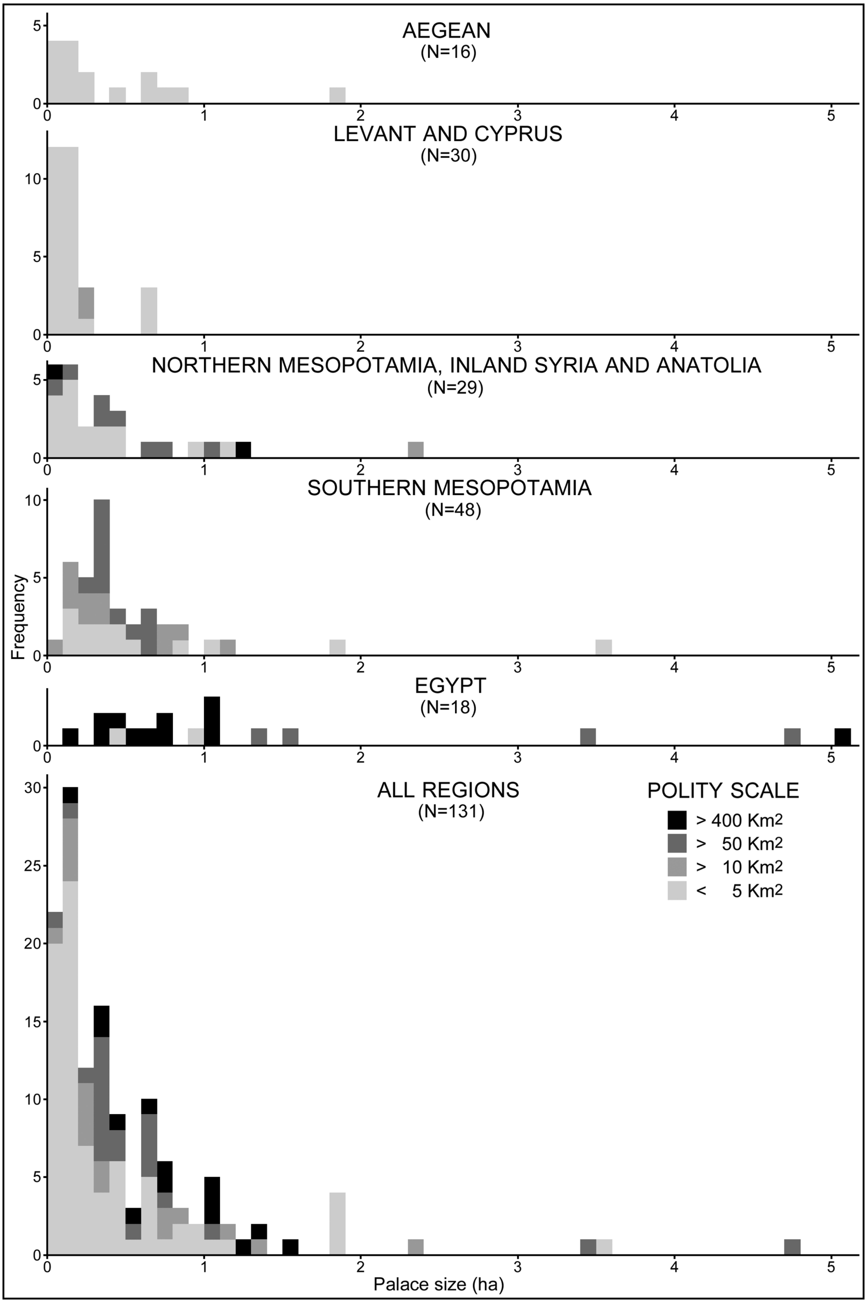

Fig. 7.15. Palace size by region and estimated polity extent (polity sizes are in thousands of km²).

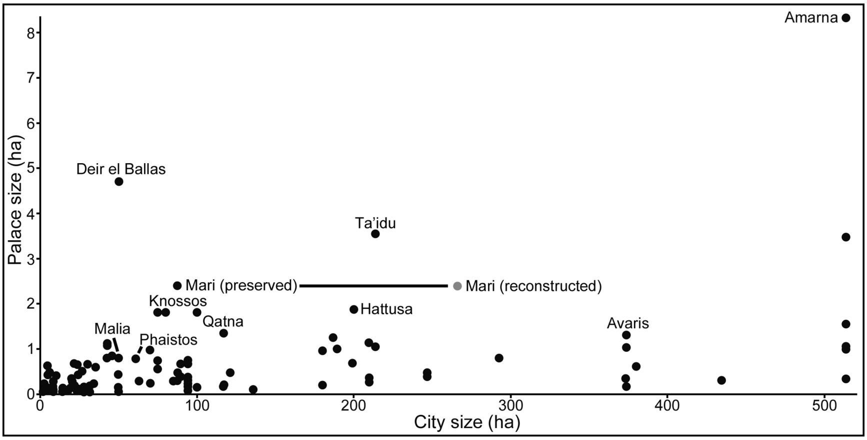

Fig. 7.16. Palace size in relation to city size.

Some limits on palace size might be imposed by constraints on development within crowded cities, and the ability to clear space for construction may be an index of political power. However, exceptionally large palaces are also associated with the policy in some large empires of constructing new royal cities, relevant here for Egypt, but also later Assyria and some Chinese dynasties. Were there organizational innovations in such large empires that, while allowing effective integration of extensive territories, also had ramifications at the small scale, allowing more effective integration of individual institutions?

Considering their status within the city, palaces may be positioned at a prominent point in the city, to be visible both from within and from the countryside when approaching the city. But in a relatively flat context, the palace might only be visible if it extended upwards beyond the normal one- and two-storey houses surrounding it, though this visibility might be limited within the city to views from rooftops. Even with greater height, city streets were almost invariably narrow and winding, providing no clear vistas; Amarna was an exception, which may be due to its layout as a new city. Architecturally distinctive or elaborated, tall facades distinguished most palaces from domestic structures, and often will have shared some architectural elements with temples.

Rarely are there extensive courts outside palaces that would have provided performance areas for crowds, for which the palace could provide a symbolic focus or backdrop. In most cases, individuals or relatively restricted groups had to be admitted to the more constrained interior courts for ceremonies or more everyday business, as participants or observers. While emphasizing power and control, this would have limited direct participation, and served both to exclude and differentiate (Baines 2006). The elaboration, often monumentalization, of the gates of palaces and temples emphasizes this element of

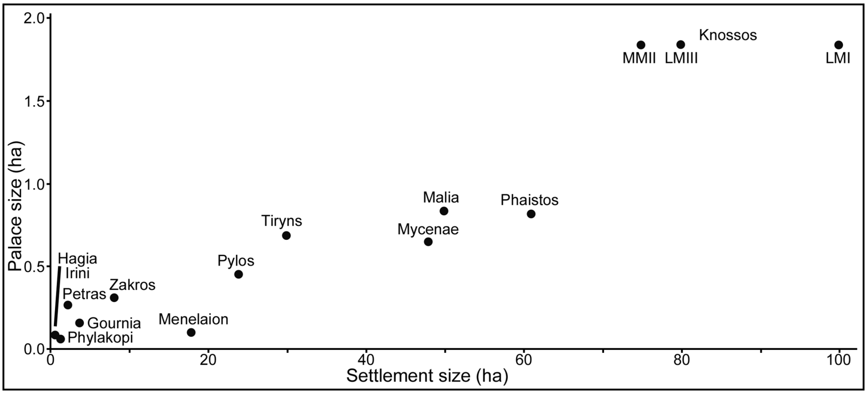

Fig. 7.17. Palace size in relation to settlement size in the Aegean.

control. To some extent, this exclusion might have been countered by processional rituals, noted in some texts (Hundley 2013; Dolce 2010; Ristvet 2011; Pardee 2002). These linked palaces to temples, but also to other cities, and to temples or shrines in other cities and the countryside, providing potential opportunities for participation (or at least observation) and some engagement by large numbers of city and potentially rural residents.

In Crete, the three major palaces are relatively large compared with most contemporary eastern examples (Fig. 7.15). This may, to a degree, compensate for the absence of multiple palaces with more distributed palatial functions, though structures such as Mu or the Little Palace may have had such roles. However, the good correlation between palace size and city size in the Aegean (Fig. 7.17) suggests a more direct relationship between resource base and palatial monumentality than in many eastern polities. Also standing out is the very high degree of similarity among at least Knossos, Malia, and Phaistos, extending not just to layout and specific architectural components, but also orientation. While these general parallels have long been noted, less attention has been paid to trying to understand what is more or less standardized and why. The west court, west wing, and central court configuration in these three palaces is very standardized in location, association, and configuration. Other elements such as other magazines, domestic quarters, and pillar halls need to be present, but their location within each complex is not fixed, and other features vary: the convoluted access to the central court at Knossos, but direct access at Malia. Some elements may be unique to one palace (e.g. the Malia silos). Smaller palaces share these elements to varying degrees. The exceptional degree of standardization has been explained as convergence due to Peer Polity Interaction emulation (Cherry 1986), though the recent re-evaluations of the phasing of the final phases of the Neopalatial palaces (Driessen, Schoep, and Laffineur 2002) now hold out the possibility that this convergence may be relatively late, and potentially due to explicit Knossian imposition.

The visibility and accessibility of each palace varies considerably. Phaistos was very visible, perched on the hill at the north-east of the city (a situation duplicated at Galatas), but access through the city will have been more laboured. Access into the palace from the well-defined and monumentalized west court was direct into both the second storey of the palace and the central court. At Knossos, the palace lay below much of the town on the low hill above the Kairatos and Vlychia streams, but potentially visible from gaps in buildings around the town, from the surrounding hills, and from the main route into the city from the south. Access to the relatively small west court was through a much larger paved court further west, with the palace facade providing an impressive backdrop for ceremonies, which only a limited audience could observe. Access beyond, into the palace, was through the central court, via a circuitous passage. Paved walkways will have allowed more of the civic population to observe processions to and from the palace, but only limited scope for active participation (see chapter 8). Malia would have been the least visible palace, on only the slightest of rises, though this is to a degree compensated for by having the largest west court, and an even larger eastern court, making the palace visible from the main eastern entrance to the city. The large west court had the monumental palace west facade as backdrop, though curiously the main and wide direct entrances to the central court are from the south and south-east, through less impressive facades. At Malia, additional civic buildings constructed in the Protopalatial period, but continuing in use into the Neopalatial period, represent a more complex civic environment at the core of the city, not (so far) recognized at the other, less extensively investigated sites.

These similarities, but also differences, the latter exacerbated when we also consider the smaller palaces (e.g. Zakros, Galatas, Gournia, Petras, Haghia Triada), provide cues to the role of the palaces which have yet to be fully explored. Recent studies exploring experiential approaches (Adams 2007; Letesson and Vansteenhuyse 2006; Haciguzeller 2008) need to be expanded and could usefully be approached comparatively, considering what characteristics are shared with other Bronze Age palaces, and indeed those from other periods, elsewhere.

7.7.2. Temples

Temples share elements with palaces, but are also more variable interregionally, both physically and as institutions (Hundley 2013), and their significance varies through time, initially larger and more clearly identifiable than palaces, though eventually largely subsumed within palatial power, at least within Mesopotamia.

In Mesopotamia, temples could be major institutions, though each city would have multiple temples, some exceedingly large (some with ziggurats), but others considerably smaller, down to the scale of neighbourhood shrines (Fig. 7.18). The largest were diverse institutions, with extensive agricultural holdings and subsidiary rural farms, and some had urban workshops. Most of the latter are identifiable only in texts, not archaeologically recognizable either within the temple precincts, nor, without texts, able to be linked to the temple if physically independent, elsewhere in the city. The largest temples share many features with palaces, from monumentality and architectural elaborations to functional spaces such as courts, reception rooms, storage areas, archives, and residential suites, sometimes including adjacent residential palaces for religious personnel. Major temples may be spatially associated with others, but smaller examples in particular may be distributed through the city. Temples, like palaces, are rarely associated with large open public spaces, but regularly are defined by walled enclosures or precincts. These internal spaces are often considerably larger than the courts of palaces, suggesting at least occasional controlled engagement with larger numbers of the public. A few temples are directly associated with or incorporated within the precincts of palaces, particularly in Syria, with royal cults and royal burials within or associated with palaces. Texts mention rulers engaged in ceremonies at or in association with temples, and processions between palaces and temples, tying these institutions together in public performances. As with palaces, temples would not have been particularly visible within cities, though outside the Mesopotamian alluvium they may be on natural elevations or on accumulated tells. In flatter locations, they may be artificially elevated on massive podia or, in Mesopotamia, incorporate a ziggurat. Visibility and association with a 'high place' appears to have been more important, at least for major temples, than it was for palaces. In inland Syria and the coastal Levant, temples were generally much smaller than further east and in comparison with palaces. There is little textual information to indicate that they controlled major estates, as in early phases in Mesopotamia. Any associated structures are usually limited, and they may stand in small precincts or in relatively open locations.

Figure 7.18, in parallel with Figure 7.15, graphs temple area for the entire sample, again broken down by broad regions; the scale of each polity is also indicated. The similar scales of each graph allow direct comparison. The same decrease in both maximum size and central tendency can be traced from south-east to north-west, but is far more rapid and extreme. Egypt again clearly had the ability to construct exceptionally large temples—though a more detailed analysis will need to distinguish between constructed space (representing labour and maintenance costs) and the very large walled but largely open precincts common for the larger Egyptian temples. A similar 2.0 ha ceiling to that for palaces can be seen for temples in southern Mesopotamia, but other regions have a very much lower ceiling. So in Egypt and southern

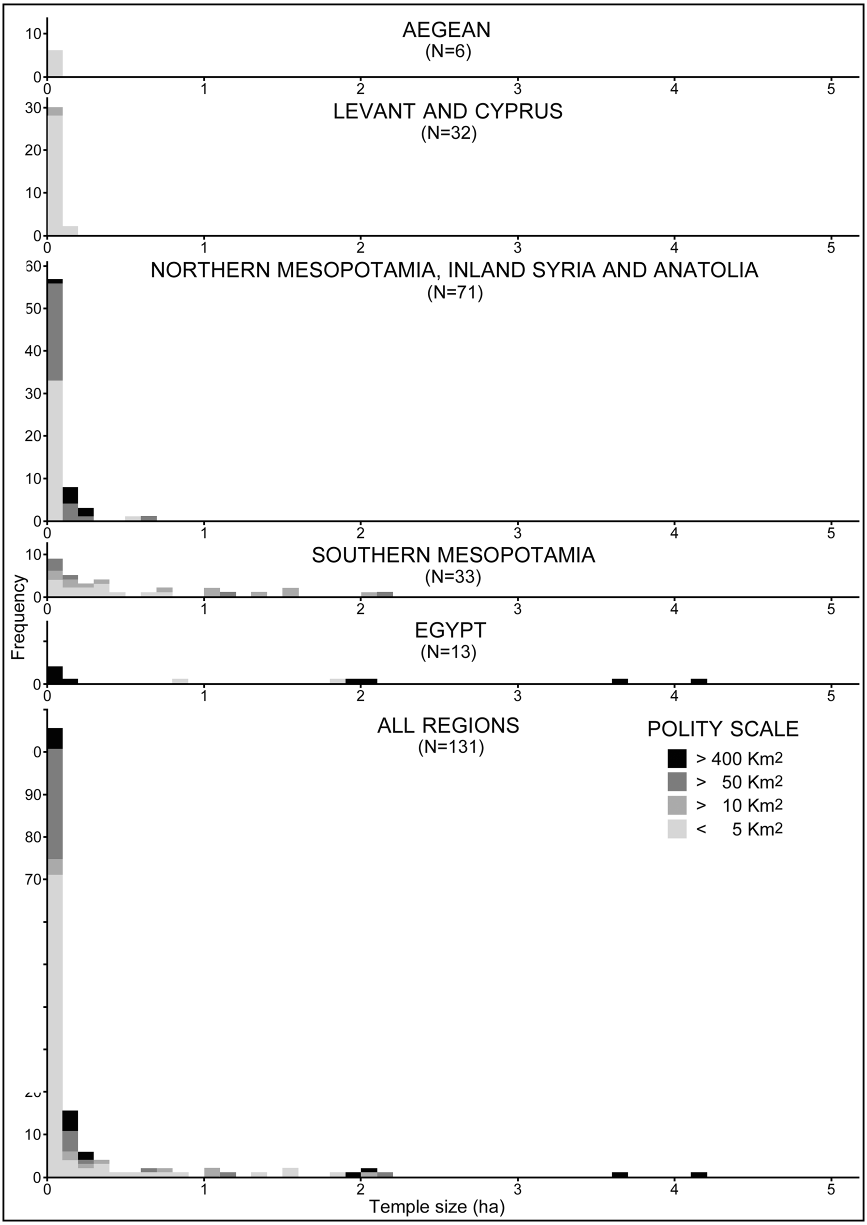

Fig. 7.18. Temple size by region and estimated polity extent (polity sizes are in thousands of km²).

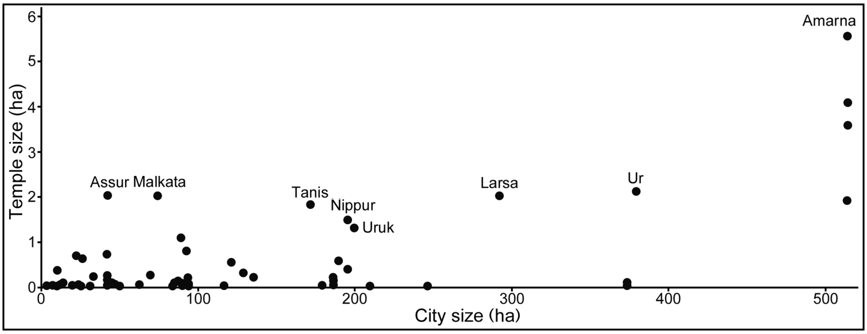

Fig. 7.19. Temple size in relation to city size.

Mesopotamia (though clearly not elsewhere) some of the same construction/maintenance and also administrative costs/integrative limits may apply to temples as for palaces. In southern Mesopotamia, this may suggest that, particularly early on when temples were independent establishments, they commanded resources to rival those of the palatial institutions. However, this will be complicated by the multiplicity of palaces linked to the central administration, whereas multiple temples were independent institutions. But perhaps the limiting scale of the resources available to individual temples set an ideological norm to which palaces responded, regardless of the resources potentially available to them. But similarities in organizational structure may also have imposed comparable limits to functional scale. Unlike palaces, there is no clear association of larger temples with larger polities.

Again considering city size (Fig. 7.19), the separation of very large temples in southern Mesopotamia (usually that of a city's patron deity) from the remaining temples is very clear. Similarly, the 2.0 ha limit can be seen to be constant once a city reaches about 50 ha, perhaps 10,000 occupants.

While in one sense fitting with this broad pattern of the decline in temple scale to the west, Prehistoric Crete stands out from this tradition remarkably, since there are no major monumental temples. Traditionally, it has been assumed that the institutions of the palace and temple were integrated in Crete (Hägg and Marinatos 1987; Schoep 2010); however there is little material evidence, in the form of offerings, which obviously represent religious ritual activity in the palaces (though to be fair, little artefactual material is recorded from the early excavations as *in situ* on the Neopalatial palace floors). There is also nothing in the layout or associated artefacts recovered in the palaces that is necessarily incompatible with purely secular palatial functions. This interpretation was established in the early twentieth century, when Near Eastern polities were assumed to be theocracies, and has not recognized the rejection of this assumption in the later twentieth century. It may be legitimate to assume a combined role, but even so, this still stands out from the other regional traditions. We may have trouble distinguishing palaces from temples in some eastern contexts (particularly in Egypt, with royal mortuary temples explicitly linking the institutions), but these usually are distinct physical institutions, even later when temples were effectively subsumed under palatial authority; so the questions seem to be about our clear recognition in specific cases, not the original conflation of functions. If Minoan palaces functioned as integrated administrative palaces and temples, as commonly assumed, the combination of resources that in other regions were divided between the two types of institution might help account for the larger than expected Minoan palaces.

The ritual establishments which can be recognized on Crete are a limited number of small urban shrines, particularly two at Protopalatial Malia. Neither is directly associated with the palace or focused civic core of the city, nor clearly connected with these by wide roadways, documenting any sort of intended direct linkage (Fig. 7.5). Both structures are small and only a limited number of individuals would have been able to participate in any rituals undertaken inside, nor are there large associated spaces directly outside for participants, or storerooms for supplies or equipment to cater to numbers. The best known shrines are the extramural cave and peak sanctuaries, chronologically associated with the period of the palaces. A very few other extra-mural shrines have been recognized (Haysom 2014–15), but are undoubtedly drastically under-represented, since (unlike the cave and peak sanctuaries) they are not associated with readily identified locations in the landscape, so their discovery is far more due to chance rather than explicit prospection. The location of some extra-mural sanctuaries well away from the palaces may invoke the idea of boundary shrines, with processions to them designed to define and regularly re-inscribe territories, aligning them with eastern practices (Dolce 2010; Ristvet 2011). The spatial association of several of the more elaborate peak sanctuaries, with palaces or major settlements, supports the idea of a direct political role for processions between palace or city and shrine (Cherry 1978; Peatfield 1987, 1990). The space at individual sanctuaries is usually limited but not enclosed, and participants could have processed sequentially through the sanctuary area, allowing participation by many. Interestingly, the imagery usually interpreted as religious emphasizes individual or small group ceremonies rather than mass events.

7.8. PUTTING TOGETHER THE PIECES: MATERIALIST PERSPECTIVES ON BRONZE AGE URBANISM

The strength of an empirical archaeological study is that we can use patterns in the data to learn what the active decision-making individuals and institutions in the past society considered to be important, within their logic, not ours—what they chose to associate, integrate or differentiate, and the distinctions they drew. The strength of a broad comparative study is that we can see at what scales, chronological or geographical, patterns occur. These can indicate which behaviours are culture specific, but also which are not. So by considering patterns in terms of contextual variables, we can learn which broader ecological, economic, political, or institutional parameters may be determining or influencing specific behaviours.

We have looked very sketchily at several overall characteristics of Bronze Age urbanism, and two central institutions that structured institution-focused societies in the Eastern Mediterranean and Near East. Are there patterns in how the pieces have been fitted together, and if so, what can these tell us about these societies, and by comparison palatial Minoan urban culture? With assumptions from our own society, and previous suggestions about pre-industrial cities, we might expect the spatial organisation of early cities to be basically concentric, with the most important components at the core, dictating the structure of the rest of the city. But these models are principally informed by modern urban organization: in large modern cities, centrality translates into accessibility, and focal institutions will be connected by significant communication infrastructure. In early, small cities, these intra-city transport and interaction costs were smaller, and appear to be relatively unimportant. Rarely were long avenues laid out to connect major institutions, markets, and gates, unless, as at Amarna, the city was built *de novo*. Rather, crooked lanes, developing through time, made every journey somewhat tortuous but, on the scale of cities usually only a few hundred metres across, rarely very long.

In fact, there is considerable variability, and some sort of concentric layout is only one pattern, occasionally seen (Chuera, Beydar; Meyer 2011; Margueron 2013). To some degree this depends on the nature of power structures. In some contexts, where an imperial authority administers cities—such as in the Assyrian and Ottoman empires, and in some periods in China—the administrative focus is located at one periphery of the city, in a clearly defined position, and with access both into and therefore through the city, but also directly to the outside world. This is essentially slightly removed and disconnected from the daily organization of the city, and highlights the external, non-local administrative and military aspects of control (Stone 1995; Novák 1999b, 2004; Kark 1981). In other contexts, centrality may have been symbolic, with temples sometimes located centrally, but visibility often seems to have been more important. This may have been dictated by the earlier development of a tell, which the city expanded around, but the institution's location on the tell, centrally (Ebla, Brak, Beydar) or peripherally (Leilan), seems to have been more important than physical centrality per se, with the emphasis on elevation and visibility. Where this could not be achieved naturally, temples might be raised on artificial platforms to make them more visible, both from within and outside the city. Palaces seem not to have needed to be as visible, and physically overlooking the city not as important to their significance (though see later Assyrian citadels: Novák 1999b, 2004). So—contrasting modern economic expediency with actual ancient practice—ideology and to some extent history, continuity, and (potentially) legitimation appear often to be more important.

How about the relations between major institutions? Here, there are very variable patterns, but these resolve somewhat if larger-scale temporal and geographical contexts are considered. In early Mesopotamian cities, palaces and temples are usually spatially distinct, in some cases at opposite ends of the city (Stone 1997, 2013; Novák 1999b). With each type of institution complex and largely economically independent, their roles overlap to a significant degree, and they represent different poles of power within the city, at least in some senses in competition. Later, there can be more direct association in precincts within the city, as temples were brought under palatial patronage or control, though traditional locations may have physically fossilized the earlier, seemingly more distinct status. In north Mesopotamia, inland Syria, and the Levant, where temples were comparatively smaller and we have little evidence that they were economically as significant as the palace, there may be more direct associations (e.g. Mari, Beydar), including some temples associated with the palace for the royal cult (e.g. Mari, Ebla, Alalakh).

Courts provide an interesting contrast between the two institutions. In both cases, there are usually only limited or no public spaces outside but directly associated with either institution—one had to enter the precincts to engage with the institution, subject to its control, emphasized by often monumental gateways. In Mesopotamia and Egypt, some temples could have relatively large enclosed spaces, suggesting the potential participation (at least on some occasions) of relatively large groups of people, though not the entire populace of the city. Palaces usually had much smaller courts and ceremonial rooms, suggesting engagement with more limited and so probably more tightly defined and controlled groups. In both cases, public engagement was explicitly physically controlled. Such engagement may have been more frequent for both types of institutions outside their precincts, with processions, whether royal or sacred, linking both institutions. But such processions, while outside the formal bounded precincts, would be scheduled and thereby still choreographed and controlled by the institutions. Overall, planned city layouts are rarely encountered, the clearest being Amarna, where the core of the city was highly structured around the institutions, with housing more informally filling in (O'Connor 1998; Kemp 2012; Lacovara 1997; Routledge 1997). The formal layout can be expected to embody actual or anticipated interactions between different institutional components of the community. Otherwise, cities usually had relatively long histories, with layouts being adapted in only limited ways to changing social and political structures. Large, formally defined open spaces seem to have had little role in most cities. While potentially useful for markets, no obvious examples have been uncovered, and it is presumed that such activities will have taken place outside or at the fringes of the city, as seems to have been the case with harbours and trading enclaves.

Rather than produce a specific model of the Bronze Age institution-centred city, we can see some patterns, but also differences. But by bringing in additional contextual information, we can get hints of what concepts may have underlain these differences. Without a second phase of detailed documentation and analysis, it is not possible to distil these into a series of alternative interpretive urban models, but there are enough patterns to suggest that such an exercise would be worth undertaking.

7.9. CONCLUSION: MINOAN URBANISM—TYPICAL OR ANOMALOUS?

How well do Minoan cities fit within this range of behaviour? In terms of overall scale and internal differentiation, we seem to be dealing with a comparable phenomenon, with considerable parallels. In terms of size, the major Minoan cities are comparable in scale to the city-state centres to the east; a limited number of those push or exceed the limits of what are likely to have been agriculturally self-sustaining, and on Crete, Knossos is likely to have fallen into that exceptional category (Fig. 7.9). In terms of community size distributions, Crete, like many Bronze Age city-state societies, is characterized by highly centralized cities, surrounded by much smaller villages and hamlets. While this distribution differs for larger-scale, very integrated settlement systems, Minoan Crete sits at the highly centralized and primate end of the scale, giving us an expectation of a distinct character for the relatively few urban centres. This raises interesting questions about the character of the smaller palace-centred towns, such as Zakros, Gournia, or Petras, which may have had political autonomy and a central administrative role for their small associated territories, but seem unlikely to have had as differentiated a population as centres like Knossos, Phaistos, or Malia. This may be represented in the contrasts in the size distributions of houses in these different communities (Whitelaw 2001a: Fig. 2.4). While our archaeological investigations to date provide only limited evidence for occupational specializations, the limited textual evidence from Crete and the mainland, primarily Linear B, paints a picture not dissimilar to that which can be derived from various East Mediterranean and Near Eastern contexts (Whitelaw forthcoming B), while also supporting the alignment of Aegean palace-centred societies with a redistributive model.

Turning to institutions, the Minoan palaces throw up some interesting comparisons. Knossos in particular seems large compared to most eastern palaces (Figs 7.15–16), particularly when considered in the context of the size of the relatively small polity which must have mobilized the resources to support it. Counterbalancing this somewhat would be the frequent existence of multiple contemporary palaces in many eastern cities—a more distributed physical manifestation of centralized royal power. Institutions like Quartier Mu at Malia or the Little Palace at Knossos may be evidence of comparable manifestations of power, but we simply do not know whether they are so directly associated, or represent independent elite establishments (also well documented in eastern cities). The Linear B tablets from the LM II–IIIA phase of the Little Palace may suggest a connection with the palace, but this remains uncertain, and should not, in any case, be projected back into the Neopalatial period.

The major Minoan palaces also stand out to the degree that they are so closely comparable in layout and orientation (see also chapter 8); this is not even obvious with contemporary multiple palaces within specific cities, such as Amarna, Ebla, Qatna, Beydar, or Mari, let alone between different contemporary cities. So there appears to be an exceptional degree of ideological unity; is this a specific manifestation of Knossian hegemony (political or merely cultural), or perhaps a corollary of Crete's inward focus, isolated at the extreme fringe of the Bronze Age palatial *koine*? But this high degree of standardization of the major palaces then raises new questions about why there is variation in the location of some regular components of palatial architecture, and why the smaller palaces and grand houses in other communities did not need to conform to the same conventions to the same degree. How significant were these architectural elements, and to whom?

The anomalous absence of monumental temples in Crete has already been noted. While we may choose to accept the traditional assumption that the palaces were both rulers' palaces and temples, there is little or nothing to obviously support their use as temples conceived as the house of a god or gods or for their worship (Hundley 2013). But even accepting this long-standing assumption recognizes a unique synthesis among Bronze Age societies across our broad study region, and so deserves emphasis. The small urban shrines known so far are distinctly unimpressive, and clearly not designed to cater to large numbers of visitors or worshippers—perhaps a stronger argument for a dual role for the palaces than can be based on the evidence from the palaces themselves. There is no evidence for distinct temple or religious institutions with a significant role in urban organization or structure. Perhaps surprising given recent arguments, this characteristic in particular suggests that power in Minoan Crete was probably *less* heterarchical than in most other Bronze Age polities in the East Mediterranean and Near East. While an absence of competing institutions may account for the larger than expected Minoan palaces, it also raises questions about a potentially exceptional concentration of power in comparison with other Bronze Age palace-centred polities.

Courts and public spaces can be distributed along a rough scale of association with the palaces, from the central courts to west courts and other urban spaces, such as the Agora at Malia, the east court at Malia, and the outer west court at Knossos (see also chapter 15). That these were clearly differentiated, spatially and architecturally, suggests they played different roles in the urban and social structure. The most obvious differences for us are their degrees of spatial association with the palaces and accessibility from the city, but these are simply our principal points of reference, whereas for occupants they will have been understood in terms of their experience of the activities which took place in each, potentially different activities at different times and bringing together different participants, for different reasons. The raised walkways seem designed to channel processions, as depicted in late frescoes at Knossos—though if the 'Sacred Grove and Dance' fresco is correctly interpreted as representing a performance in a west court, then not all ceremonial activity was confined to the walkways. From our comparative perspective, there are equivalents for the interior central court in eastern palaces and temple compounds. In eastern cities, significantly less provision is made for courts outside major institutions such as palaces or temples, suggesting that in Crete there was a more important social and political role for semi-accessible performances and displays. Clues to their roles may come from the ways in which different spaces are adapted or combined at other sites, with the size and orientation of the public court at Gournia suggesting some combination of palace-associated central court with more public space. This interpretation was further generalized to non-palatial communities, so that central communal spaces have been identitied at Pseira and possibly Myrtos Pyrgos—though also directly associated with the mansion or most elaborate house in the community—but there is the risk of carrying over certain expectations as to the function and significance of such spaces, without critically assessing them in their own right and specific context.

In terms of urban infrastructure, the Stepped Portico at Knossos, as reconstructed by Evans, would at least in earlier phases have led directly to the palace, with a branch possibly leading to the large western external court but not to the ceremonial west court. At Malia there was a raised walkway, as well as a visual link to the east entrance to the palace, direct from the east gate of the city, which would have connected most directly with the probable port at Hagia Varvara to the north-east. This sort of direct and obvious access to major institutions is not usually an element of eastern cities, though there are examples such as Chuera, Beydar, Ugarit, and Amarna, and possibly other major New Kingdom cities (Creekmore III 2014; Routledge 1997). In contrast, the entrances to palaces and the larger temples in most eastern cities are considerably more elaborated, often with elaborate, quasi-defensive gateways, which are not prominent in Cretan palaces; so control over access to the palaces was less obviously manifest architecturally. Is this more open presentation a reflection of the absence of alternative or competing institutions?

Malia provides provocative evidence for other institutions and activity spaces, clustered near the palace and seemingly constituting the core of the city: the Agora, the Crypte Hypostyle, and the Portico opening on to the Agora (notably not the west court). So far, equivalents have not been found at the other major or minor centres; however, Building CV–CVII at Phaistos has some parallels with the Crypte, though it is not directly associated with the palace or west court (Levi 1976: 600). Because no comparable complexes have been identified at the other major centres, we do not know whether these structures and the activities or institutions they represent were unique to Malia or are simply a consequence of the far less extensive excavations at Knossos and Phaistos. Haghia Triada provides a smaller-scale but equally structured environment, with courts associated with the Villa Reale and separately with the Bastione. This latter focus may be designed to project a quite distinct message if, during the later Neopalatial period, Haghia Triada was developed as a local centre for Knossian administration of the Mesara (Privitera 2014; Whitelaw forthcoming B).

The interpretation of Quartier Mu at Malia varies considerably, with some seeing it as affiliated with the palace, others as an independent institution (Poursat 1983, 1988; Schoep 2002b, 2006). Parallels supporting either option can be identified, for example at Ugarit. If structures such as the Magasins Dessenne, and later Quartier Epsilon (and any Protopalatial precursor) are comparable to Mu, this might support identification as non-palatial elite foci. Neither interpretation would be out of place in eastern urban centres, so require no unique social models.

I have highlighted points both of similarity and of difference between Minoan urban centres and their Bronze Age contemporaries further east. In a few characteristics the Minoan cities stand out, but in others they broadly conform, particularly in overall scale and scale of investment in institutional structures (at least palaces). In specific characteristics, some parallels can be found but some differences as well. This is the obvious limitation of a preliminary, superficial examination. But with such variation among Bronze Age institution-centred cities, further investigation of the detailed contexts of these similarities and differences should demonstrate whether these can provide a stronger comparative context for understanding Minoan and Aegean urbanism. I think there is considerable promise in pursuing this through far more detailed comparative investigations, at all scales, from regional settlement patterns, to cities as a whole, to the details of individual institutions. Such an investigation can also encourage us to engage with a wider range of questions, hinted at variously in previous sections. For example, which characteristics of the major urban centres, and individual components, were duplicated, and to what degree of detail, at smaller centres or other communities; and what does this tell us about the nature, scope, and pervasiveness of the social and political institutions and ideological structures of Minoan society? In turn, this can help us to appreciate the distinct characteristics of Minoan cities, the social contexts they created, and the life of their residents.

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REFERENCES

Adams, E. 2007. 'Approaching Monuments in the Prehistoric Built Environment: New Light on the Minoan Palaces'. *Oxford Journal of Archaeology* 26.4: 359–94.

Adams, R. 1981. *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates.* Chicago: University of Chicago Press.

Al-Khalesi, Y. 1975. 'Mesopotamian Monumental Secular Architecture in the Second Millennium B.C.'. PhD thesis. Yale University.

Alston, R. 2002. *The City in Roman and Byzantine Egypt.* London: Routledge.

Bagnall, R. 1992. 'Landholding in Late Roman Egypt: The Distribution of Wealth'. *Journal of Roman Studies* 82:128–49.

Bagnall, R. and B. Frier. 2006. *The Demography of Roman Egypt.* Cambridge: Cambridge University Press.

Baines, J. 1995. 'Palaces and Temples of Ancient Egypt'. In *Civilizations of the Ancient Near East.* Vol. 1, edited by J. Sasson. New York: Scribner: 303–17.

Baines, J. 2006. 'Public Ceremonial Performance in Ancient Egypt: Exclusion and Integration'. In *Archaeology of Performance: Theaters of Power, Community, and Politics*, edited by T. Inomata and L. Cobin. New York: Altamira: 261–302.

Baines, J. 2015a. 'Ancient Egyptian Cities: Monumentality and Performance'. In *The Cambridge World History.* Vol. 3: *Early Cities in Comparative Perspective, 4000 BCE–1200 CE*, edited by N. Yoffee. Cambridge: Cambridge University Press: 27–47.

Baines, J. 2015b. 'City and Countryside, Image and Text: Balancing Rural and Urban Values in Third Millennium Egypt'. In *Social Theory in Archaeology and Ancient History: The Present and Future of Counternarratives*, edited by G. Emberling. Cambridge: Cambridge University Press: 161–84.

Bairoch, P. 1988. *Cities and Economic Development: From the Dawn of History to the Present.* Chicago: University of Chicago Press.

Barjamovic, G. 2011. 'Pride, Pomp and Circumstance: Palace, Court and Household in Assyria 879–612 BCE'. In *Royal Courts in Dynastic States and Empires: A Global Perspective*, edited by J. Duindam, T. Artan, and M. Kunt. Leiden: Brill: 25–62.

Barjamovic, G. 2013. 'Mesopotamian Empires'. In *Oxford Handbook of the State in the Ancient Near East and Mediterranean*, edited by P. Bang and W. Scheidel. Oxford: Oxford University Press: 120–60.

Battini, L. 2009. 'Le tissu urbain de Nuzi: Nouvelles perspectives'. In *Studies on the Civilization and Culture of Nuzi and the Hurrians*, Vol. 18, edited by G. Wilhelm. Bethesda, MD: CDL Press: 637–63.

Battini, L. 2012. 'Tradition et innovation dans l'architecture domestique de Nuzi'. In *The Nuzi workshop at the 55th Rencontre Assyriologique Internationale (July 2009, Paris)*, edited by P. Abrahami and B. Lion. Bethesda, MD: CDL Press: 1–31.

Battini-Villard, L. 1999. *L'espace domestique en Mésopotamie de la IIIe dynastie d'Ur à l'époque paléo-babylonienne.* Oxford: J. and E. Hedges.

Bennet, J. 1999. 'The Mycenaean Conceptualization of Space or Pylian Geography (… Yet Again!)'. In *Floreant Studia Mycenaea. Akten des X. Internationalen Mykenologischen Colloquiums in Salzburg vom 1.–5. Mai 1995*, Band I, edited by S. Deger-Jalkotzy, S. Hiller, and O. Panagl. Vienna: Verlag der Österreichischen Akademie der Wissenschaften: 131–57.

Bennet, J. 2008. 'Palace TM: Speculations on Palatial Production in Mycenaean Greece with (Some) Reference to Glass'. In *Vitreous Materials in the Late Bronze Age Aegean*, edited by C. Jackson and E. Wager. Oxford: Oxbow Books: 151–72.

Bennet, J. and P. Halstead. 2014. 'O-no! Writing and Righting Redistribution'. In *KE-RA-ME-JA: Studies Presented to Cynthia W. Shelmerdine*, edited by D. Nakassis, J. Gulizio, and S. James. Philadelphia, PA: INSTAP Academic Press: 271–82.

Betancourt, P. and N. Marinatos. 1997. 'The Minoan Villa. Part I: The Definition of the Minoan Villa'. In *The Function of the Minoan Villa. Proceedings of the Eighth International Symposium at the Swedish Institute at Athens, 6–8 June 1992*, edited by R. Hägg. Stockholm: Svenska institutet i Athen: 91–2.

Bettencourt, L., J. Lobo, D. Helbing, C. Kühnert, and G. West. 2007. 'Growth, Innovation, Scaling, and the Pace of Life in Cities'. *Proceedings of the National Academy of Sciences* 104.17: 7301–6.

Bettencourt, L., J. Lobo, D. Strumsky, and G. West. 2010. 'Urban Scaling and its Deviations: Revealing the Structure of Wealth, Innovation and Crime across Cities'. *Plos One* 5.11: e13541.

Bonacossi, D. and M. Iamoni. 2015. 'Landscape and Settlement in the Eastern Upper Iraqi Tigris and Navkur Plains: The Land of Nineveh Archaeological Project, Seasons 2012–2013'. *Iraq* 77: 9–39.

Bowman, A. and A. Wilson. 2011. *Settlement, Urbanization and Population.* Oxford: Oxford University Press.

Bracci, S. 2008. 'Remarks on the Relation between Town and Country in the Ancient Near East: The Case of Nuzi'. In *Proceedings of the 4th International Congress of the Archaeology of the Ancient Near East, 29 March–3 April 2004, Freie Universität Berlin: The Reconstruction of Environment: Natural Resources and Human Interrelations Through Time; Art History: Visual Communication.* Vol. 1, edited by H. Kühne, R. Czichon, and F. Kreppner. Wiesbaden: Harrassowitz: 29–41.

Bracci, S. 2009. 'Remarks on the Topography of the Town of Nuzi—Yorgan Tepe'. In *Studies on the Civilization and Culture of Nuzi and the Hurrians*, Vol. 18, edited by G. Wilhelm. Bethesda, MD: CDL Press: 3–32.

Branigan, K. 1972. 'Minoan Settlements in East Crete'. In *Man, Settlement and Urbanism*, edited by P. Ucko, R. Tringham, and G. Dimbleby. London: Duckworth: 751–9.

Branigan, K. 2001. 'Aspects of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 38–50.

Brumfiel, I. E. 1976. 'Regional Growth in the Eastern Valley of Mexico: A Test of the "Population Pressure" Hypothesis'. In *The Early Mesoamerican Village*, edited by K. Flannery. New York: Academic Press: 34–49.

Brusasco, P. 1999–2000. 'Family Archives and the Use of Space in Old Babylonian Houses at Ur'. *Mesopotamia* 34–5: 3–173.

Brusasco, P. 2007. *The Archaeology of Verbal and Nonverbal Meaning: Mesopotamian Domestic Architecture and Its Textual Dimension.* Oxford: Archaeopress.

Cadogan, G. 1976. *Palaces of Minoan Crete.* London: Barrie and Jenkins.

Carneiro, R. 1967. 'On the Relationship Between Size of Population and Complexity of Social Organization'. *Southwestern Journal of Anthropology* 23.3: 234–43.

Carter, H. 1983. *An Introduction to Urban Historical Geography.* London: Edward Arnold.

Carter, T. and M. Ydo. 1996. 'The Chipped and Ground Stone'. In *Continuity and Change in a Greek Rural Landscape: The Laconia Survey.* Vol. II: *Archaeological Data*, edited by W. Cavanagh, J. Crouwel, R. Catling, and G. Shipley. London: British School at Athens: 141–82.

Casana, J. and J. Cothren. 2013. 'The CORONA Atlas Project: Orthorectification of CORONA Satellite Imagery and Regional-Scale Archaeological Exploration in the Near East'. In *Mapping Archaeological Landscapes from Space*, edited by D. Comer and M. Harrower. New York: Springer: 33–43.

Cherry, J. 1978. 'Generalization and the Archaeology of the State'. In *Social Organisation and Settlement: Contributions from Anthropology, Archaeology and Geography*, edited by D. Green, C. Haselgrove, and M. Spriggs. Oxford: British Archaeological Reports: 411–37.

Cherry, J. 1986. 'Polities and Palaces: Some Problems in Minoan State Formation'. In *Peer Polity Interaction and Socio-political Change*, edited by C. Renfrew and J. Cherry. Cambridge: Cambridge University Press: 19–45.

Chisholm, M. 1968. *Rural Settlement and Land Use.* 2nd edn. London: Hutchinson.

Chiti, B. 2015. 'Architecture domestique et société dans la Syrie du Bronze Ancien (IIIe millénaire av. J.-C.). De l'approche méthodologique à l'interprétation socio-culturelle de l'habitat en Djézireh syrienne'. *Archéo.doct* 7: 33–55.

Christakis, K. 2008. *The Politics of Storage: Storage and Sociopolitical Complexity in Neopalatial Crete.* Philadelphia, PA: INSTAP Academic Press.

Chryssoulaki, S. 1990. 'L'urbanisme minoen. A. Le réseau routier urbain'. In *L'habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Athens: École française d'Athènes: 371–80.

Cipolla, C. 1993. *Before the Industrial Revolution: European Society and Economy, 1000–1700.* 3rd edn. London: Routledge.

Clark, P. 2009. *European Cities and Towns: 400–2000.* Oxford: Oxford University Press.

Clark, P. (ed.). 2013. *The Oxford Handbook of Cities in World History.* Oxford: Oxford University Press.

Clark, P. and B. Lepetit. 1996. 'Introduction'. In *Capital Cities and Their Hinterlands in Early Modern Europe*, edited by P. Clark and B. Lepetit. Aldershot: Scolar Press: 1–25.

Cowgill, G. 2015. *Ancient Teotihuacan: Early Urbanism in Central Mexico.* Cambridge: Cambridge University Press.

Creekmore III, A. 2014. 'The Social Production of Space in Third-Millennium Cities of Upper Mesopotamia'. In *Making Ancient Cities: Space and Place in Early Urban Societies*, edited by A. Creekmore III and K. Fisher. Cambridge: Cambridge University Press: 32–73.

Creekmore III, A. and K. Fisher (eds). 2014. *Making Ancient Cities: Space and Place in Early Urban Societies.* Cambridge: Cambridge University Press.

Crocker, P. 1985. 'Status Symbols in the Architecture of el-ʿAmarna'. *Journal of Egyptian Archaeology* 71: 52–65.

Crumley, C. 1995. 'Heterarchy and the Analysis of Complex Societies'. *Archaeological Papers of the American Anthropological Association* 6.1: 1–5.

d'Altroy, T. and T. Earle. 1985. 'Staple Finance, Wealth Finance, and Storage in the Inka Political Economy'. *Current Anthropology* 26.2: 187–206.

Davies, J. 2004. 'The Economic Consequences of Hellenistic Palaces'. In *Making, Moving and Managing. The New World of Ancient Economies, 323–31 BC*, edited by Z. Archibald, J. Davies, and V. Gabrielsen. Oxford: Oxbow Books: 117–35.

De Vries, J. 1984. *European Urbanization, 1500–1800.* London: Methuen.

DeMarrais, E., L. Castillo, and T. Earle. 1996. 'Ideology, Materialization and Power Strategies'. *Current Anthropology* 37: 15–31.

Devolder, M. 2013. *Construire en Crète minoenne: une approche énergétique de l'architecture néopalatiale* (Aegaeum 35). Leuven: Peeters.

Diakonoff, I. 1969. 'The Rise of the Despotic State in Ancient Mesopotamia'. In *Ancient Mesopotamia. Socio-Economic History. A Collection of Studies by Soviet Scholars*, edited by I. Diakonoff. Moscow: Nauka: 173–203.

Diakonoff, I. 1982. 'The Structure of Near Eastern Society before the Middle of the 2nd Millennium BC'. *Oikumene* 3: 7–100.

Dolce, R. 2010. 'The Structure and Significance of the Topography of Cult Places in Early Syrian Ebla: An Examination of Urban and Ideological Routes in the Mega-City'. *Mesopotamia* 45: 1–17.

Dosch, G. 1996. 'Houses and Households in Nuzi: The Inhabitants, the Family and Those Dependent on It'. In *Houses and Households in Ancient Mesopotamia: Papers Read at the 40e Rencontre Assyriologique Internationale, Leiden, July 8, 1993*, edited by K. Veenhof. Leiden: Nederlands Historisch-Archaeologisch Instituut te Istanbul: 301–8.

Driessen, J. 2001. 'History and Hierarchy: Preliminary Observations on the Settlement Pattern in Minoan Crete'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 51–71.

Driessen, J. 2002. '"The King Must Die": Some Observations on the Use of Minoan Court Compounds'. In *Monuments of Minos: Rethinking the Minoan Palaces*

(Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 1–14.

Driessen, J. 2009. 'Daidalos' Designs and Ariadne's Threads: Minoan Towns as Places of Interaction'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 41–54.

Driessen, J., I. Schoep, and R. Laffineur (eds). 2002. *Monuments of Minos: Rethinking the Minoan Palaces* (Aegaeum 23). Liège: Université de Liège.

Eisenstadt, S. and A. Shachar. 1987. *Society, Culture and Urbanization.* London: Sage.

Erdkamp, P. 2001. 'Beyond the Limits of the "Consumer City": A Model of the Urban and Rural Economy in the Roman World'. *Historia: Zeitschrift für Alte Geschichte* 50: 332–56.

Erdkamp, P. 2012. 'Urbanism'. In *The Cambridge Companion to the Roman Economy*, edited by W. Scheidel. Cambridge: Cambridge University Press: 241–65.

Erdkamp, P. 2015. 'Agriculture, Division of Labour and the Paths to Economic Growth'. In *Ownership and Exploitation of Land and Natural Resources in the Roman World*, edited by P. Erdkamp, K. Verboven, and A. Zuiderhoek. Oxford: Oxford University Press: 18–41.

Evans, S. and J. Pillsbury (eds). 2004. *Palaces of the Ancient New World: A Symposium at Dumbarton Oaks, 10th and 11th October 1998.* Washington, DC: Dumbarton Oaks Research Library and Collection.

Fales, F. 2013. 'The Temple and the Land'. In *Tempel im Alten Orient*, edited by K. Kaniuth, A. Lohnert, J. Miller, A. Otto, M. Roaf, and W. Sallaberger. Wiesbaden: Harrassowitz: 85–102.

Farrington, I. 2013. *Cusco: Urbanism and Archaeology in the Inka World.* Gainesville, FL: University Press of Florida.

Feinman, G. 1998. 'Scale and Social Organization: Perspectives on the Archaic State'. In *Archaic States*, edited by J. Marcus and G. Feinman. Santa Fe, NM: School of American Research Press: 95–133.

Feinman, G. 2011. 'Size, Complexity, and Organizational Variation: A Comparative Approach'. *Cross-Cultural Research* 45.1: 37–58.

Finley, M. 1957. 'The Mycenaean Tablets and Economic History'. *Economic History Review* 10: 128–41.

Finley, M. 1973. *The Ancient Economy.* London: Chatto and Windus.

Foucault-Forest, C. 1996. *L'habitat privé en Palestine au Bronze Moyen et au Bronze Récent.* Oxford: Tempus Reparatum.

Fox, R. 1977. *Urban Anthropology: Cities in Their Cultural Settings.* London: Prentice-Hall.

Friedmann, J. 1961. 'Cities in Social Transformation'. *Comparative Studies in Society and History* 4: 86–103.

Frier, B. 2000. 'Demography'. In *The Cambridge Ancient History*, Vol. 11: *The High Empire, AD 70–192.* 2nd edn, edited by A. Bowman, P. Garnsey, and D. Rathbone. Cambridge: Cambridge University Press: 787–816.

Garfinkle, S. 2005. 'Public versus Private in the Ancient Near East'. In *A Companion to the Ancient Near East*, edited by D. Snell. Oxford: Blackwell: 385–96.

Garfinkle, S. 2013. 'Ancient Near Eastern City States'. In *The State in the Ancient Near East and Mediterranean*, edited by P. Bang and W. Scheidel. Oxford: Oxford University Press: 94–119.

Goddeeris, A. 2007. 'The Old Babylonian Economy'. In *The Babylonian World*, edited by G. Leick. London: Routledge: 198–209.

Grabbe, L. and R. Haak (eds). 2001. *Every City Shall be Forsaken: Urbanism and Prophecy in Ancient Israel and the Near East.* Sheffield: Sheffield Academic Press.

Graham, J.W. 1962. *The Palaces of Crete.* Princeton, NJ: Princeton University Press.

Guadelupe Mastache, A., R. Cobean, A. Garcia Cook, and K. Hirth (eds). 2008. *El urbanismo en Mesoamérica/Urbanism in Mesoamerica.* Mexico City: Instituto Nacional de Antropología e Historia.

Haciguzeller, P. 2008. 'Modeling Human Circulation in the Minoan Palace at Malia'. In *CAA 2007—Layers of Perception: Proceedings of the 35th International Conference on Computer Applications and Quantitative Methods in Archaeology (CAA), Berlin, Germany, April 2–6, 2007*, edited by A. Posluschny, K. Lambers, and I. Herzog. Frankfurt: Römisch-Germanische Kommission des Deutschen Archäologischen Instituts: 336–40.

Hägg, R. and N. Marinatos (eds). 1987. *The Function of the Minoan Palaces: Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984.* Stockholm: Svenska institutet i Athen.

Haggis, D. 2005. *Kavousi. The Results of the Excavations at Kavousi in Eastern Crete I. The Archaeological Survey of the Kavousi Region.* Philadelphia, PA: INSTAP Academic Press.

Halstead, P. 1999. 'Towards a Model of Mycenaean Palatial Mobilization'. In *Rethinking Mycenaean Palaces: New Interpretations of an Old Idea*, edited by M. Galaty and W. Parkinson. Los Angeles: Cotsen Institute of Archaeology: 35–41.

Halstead, P. 2011. 'Redistribution in Aegean Palatial Societies: Terminology, Scale and Significance'. *American Journal of Archaeology* 115: 229–35.

Hamilakis, Y. and N. Momigliano (eds). 2006. *Archaeology and European Modernity: Producing and Consuming the 'Minoans'.* Padua: Aldo Ausilo Editore.

Hansen, M. 1997. 'The Polis as an Urban Centre: The Literary and Epigraphical Evidence'. In *The Polis as an Urban Centre and as a Political Community*, edited by M. Hansen. Copenhagen: Kongelige Danske Videnskabernes Selskab.

Hansen, M. 2004. 'The Concept of the Consumption City Applied to the Greek Polis'. In *Once Again: Studies on the Ancient Greek Polis*, edited by T. Nielsen. Stuttgart: Franz Steiner: 9–48.

Hayden, B. 2004. *Reports on the Vrokastro Area, Eastern Crete*, Vol. 2: *The Settlement History of the Vrokastro Area and Related Studies.* Philadelphia, PA: University of Pennsylvania Press.

Haysom, M. 2014–15. 'Recent Research into Minoan Extra-Urban Sanctuaries'. *Archaeological Reports 2014–2015*: 94–103.

Heinrich, E. 1982. *Die Tempel und Heiligtümer im alten Mesopotamien: Typologie, Morphologie und Geschichte.* Berlin: de Gruyter.

Heinrich, E. 1984. *Die Paläste im alten Mesopotamien.* Berlin: de Gruyter.

Heltzer, M. 1976. *The Rural Community in Ancient Ugarit.* Wiesbaden: Reichart Verlag.

Heltzer, M. 1982. *The Internal Organization of the Kingdom of Ugarit.* Wiesbaden: Reichert.

Hood, S. 1977. 'Minoan Town-shrines?'. In *Greece and the Eastern Mediterranean in Ancient History and Prehistory: Studies Presented to Fritz Schachermeyr on the Occasion of his Eightieth Birthday*, edited by K. Kinzl. Berlin: de Gruyter: 158–72.

Hundley, M. 2013. *Gods in Dwellings: Temples and Divine Presence in the Ancient Near East.* Atlanta, GA: Society of Biblical Literature.

Hutchinson, R. W. 1950. 'Prehistoric Town Planning in Crete'. *Town Planning Review* 21: 199–220.

Jameson, M., C. Runnels, and T. van Andel. 1994. *A Greek Countryside: The Southern Argolid from Prehistory to the Present Day.* Stanford, CA: Stanford University Press.

Kardulias, P. N. 1992. 'The Ecology of Bronze Age Flaked Stone Tool Production in Southern Greece: Evidence from Agios Stephanos and the Southern Argolid'. *American Journal of Archaeology* 96.3: 421–42.

Kark, R. 1981. 'The Traditional Middle Eastern City: The Cases of Jerusalem and Jaffa During the Nineteenth Century'. *Zeitschrift des Deutschen Palästina-Vereins* 97: 93–108.

Kemp, B. 2012. *The City of Akhenaten and Nefertiti: Amarna and its People.* London: Thames and Hudson.

Kempinski, A. 1992. *The Architecture of Ancient Israel: From the Prehistoric to the Persian Periods.* Jerusalem: Israel Exploration Society.

Killen, J. 1985. 'The Linear B Tablets and the Mycenaean Economy'. In *Linear B: A 1984 Survey. Mycenaean Colloquium of the VIII Congress of the International Federation of the Societies of Classical Studies*, edited by A. Morpurgo Davies and Y. Duhoux. Louvain-la-Neuve: Cabay: 241–305.

Killen, J. 2008. 'Mycenaean Economy'. In *A Companion to Linear B: Mycenaean Greek Texts and their World*, Vol. 1, edited by Y. Duhoux and A. Morpurgo Davies. Leuven: Peeters: 159–200.

Knappett, C. 2009. 'Scaling Up: From Household to State in Bronze Age Crete'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 14–26.

Knauss, J. 2001. *Späthelladische Wasserbauten: Erkundungen zu wasserwirtschaftlichen Infrastrukturen der mykenischen Welt.* Munich: Technische Universität München.

Kosse, K. 1990. 'Group Size and Societal Complexity: Thresholds in the Long-Term Memory'. *Journal of Anthropological Archaeology* 9.3: 275–303.

Kosse, K. 1994. 'The Evolution of Large, Complex Groups: A Hypothesis'. *Journal of Anthropological Archaeology* 13.1: 35–50.

Kron, G. 2011. 'The Distribution of Wealth at Athens in Comparative Perspective'. *Zeitschrift für Papyrologie und Epigraphik* 179: 129–38.

Lacovara, P. 1997. *The New Kingdom Royal City.* London: Kegan Paul International.

Laurence, R. 2007. *Roman Pompeii: Space and Society.* 2nd edn. London: Routledge.

Laurence, R., A. S. E. Cleary, and G. Sears. 2011. *The City in the Roman West, c. 250 BC–c. AD 250.* Cambridge: Cambridge University Press.

Laurence, R. and D. Newsome (eds). 2011. *Rome, Ostia, Pompeii: Movement and Space.* Oxford: Oxford University Press.

Lehner, M. 2000. 'Fractal House of Pharaoh: Ancient Egypt as a Complex Adaptive System, a Trial'. In *Dynamics in Human and Primate Societies: Agent-based Modelling of Social and Spatial Processes*, edited by T. Kohler and G. Gumerman. Oxford: Oxford University Press: 275–353.

Letesson, Q. and K. Vansteenhuyse. 2006. 'Towards an Archaeology of Perception: "Looking" at the Minoan Palaces'. *Journal of Mediterranean Archaeology* 19.1: 91–119.

Levi, D. 1976. *Festòs e la civiltà minoica.* Rome: Edizioni dell'Ateneo.

Liverani, M. 1997. 'The Ancient Near Eastern City and Modern Ideologies'. In *Die Orientalische Stadt*, edited by G. Wilhelm. Berlin: Deutsch Gesellschaft: 85–108.

Liverani, M. 2005a. 'Historical Overview'. In *A Companion to the Ancient Near East*, edited by D. Snell. Oxford: Blackwell: 3–19.

Liverani, M. 2005b. 'The Near East: The Bronze Age'. In *The Ancient Economy: Evidence and Models*, edited by J. Manning and I. Morris. Stanford, CA: Stanford University Press: 47–57.

Liverani, M. 2013. 'Power and Citizenship'. In *The Oxford Handbook of Cities in World History*, edited by P. Clark. Oxford: Oxford University Press: 164–80.

Lo Cascio, E. 2006. 'The Role of the State in the Roman Economy: Making Use of the New Institutional Economics'. In *Ancient Economies Modern Methodologies: Archaeology, Comparative History, Models and Institutions*, edited by P. Bang, M. Ikeguchi, and H. Ziche. Bari: Edipuglia: 215–34.

Lo Cascio, E. and P. Malanima. 2014. 'Ancient and Pre-Modern Economies. GDP in Roman Empire and Early Modern Europe'. In *Quantifying the Greco-Roman Economy and Beyond*, edited by F. de Callataÿ. Bari: Edipuglia: 229–51.

London, G. 1992. 'Tells: City Center or Home?'. *Eretz-Israel: Archaeological, Historical and Geographical Studies* 23: 71–9.

Luis de Rojas, J. 2012. *Tenochtitlan: Capital of the Aztec Empire.* Gainsville, FL: University Press of Florida.

Maddison, A. 2007. *Contours of the World Economy, 1–2030 AD: Essays in Macro-Economic History.* Oxford: Oxford University Press.

Mallowan, M., T. Mitchell, and L. Woolley. 1976. *Ur Excavations* Vol. 7: *The Old Babylonian Period.* London: British Museum Publications.

Marcus, J. 1983. 'On the Nature of the Mesoamerican City'. In *Prehistoric Settlement Patterns: Essays in Honor of Gordon R. Willey*, edited by E. Vogt and R. Leventhal. Albuquerque, NM: University of New Mexico Press: 195–242.

Marcus, J. 1998. 'The Peaks and Valleys of Ancient States: An Extension of the Dynamic Model'. In *Archaic States*, edited by G. Feinman and J. Marcus. Santa Fe, NM: School of American Research: 59–94.

Marcus, J. and J. Sabloff (eds). 2008a. *The Ancient City: New Perspectives on Urbanism in the Old and New World.* Santa Fe, NM: School for Advanced Research Press.

Marcus, J. and J. Sabloff. 2008b. 'Introduction'. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. Sabloff. Santa Fe, NM: School for Advanced Research Press: 3–26.

Margueron, J. 1982. *Recherches sur les palais mésopotamiens de l'Age du Bronze.* Paris: Geuthner.

Margueron, J. 2013. *Cités invisibles: la naissance de l'urbanisme au Proche-Orient ancien: approche archéologique.* Paris: Geuthner.

Masson, M. and C. Peraza Lope. 2014. *Kukulkan's Realm: Urban Life at Ancient Mayapán*. Boulder, CO: University Press of Colorado.

Mattingly, D. 1997. 'Beyond Belief? Drawing a Line Beneath the Consumer City'. In *Roman Urbanism: Beyond the Consumer City*, edited by H. Parkins. London: Routledge: 210–18.

McClellan, T. 1997. 'Houses and Households in North Syria During the Late Bronze Age'. In *Les maisons dans la Syrie antique du IIIe millénaire aux débuts de l'Islam. Pratiques et représentations de l'espace domestique*, edited by C. Castel, M. Al-Maqdissi, and F. Villeneuve. Beirut: Institut Francais d'archeologie du Proche-orient: 29–59.

McEnroe, J. 1982. 'A Typology of Minoan Neopalatial Houses'. *American Journal of Archaeology* 86.1: 3–19.

McGeough, K. 2007. *Exchange Relationships at Ugarit*. Leuven: Peeters.

McNett, C. 1970. 'A Settlement Pattern Scale of Cultural Complexity'. In *A Handbook of Method in Cultural Anthropology*, edited by R. Naroll and R. Cohen. Garden City, NY: Natural History Press: 872–86.

Meyer, J.-W. 2011. 'City planning'. In *Jezirah*, edited by M. Lebeau. Turnhout: Brepols: 129–36.

Miglus, P. 1999. *Städtische Wohnarchitektur in Babylonien und Assyrien*. Mainz: Philipp von Zabern.

Mönninghoff, H. 2014. 'Eine sozialtopographische Analyse der Wohngebiete von Nuzi'. *Altorientalische Forschungen* 41.2: 223–51.

Morley, N. 2011. 'Cities and Economic Development in the Roman Empire'. In *Settlement, Urbanization and Population*, edited by A. Bowman and A. Wilson. Oxford: Oxford University Press: 143–60.

Morris, I. 2004. 'Economic Growth in Ancient Greece'. *Journal of Institutional and Theoretical Economics* 160: 709–42.

Müller-Celka, S., D. Puglisi, and F. Bendali. 2014. 'Settlement Pattern Dynamics and Natural Resources in MM–LMI Crete: The Case of Malia'. In *Physis. L'environment naturel et la relation homme-milieu dans la monde égéen protohistorique.* (Aegaeum 37), edited by G. Touchais, R. Laffineur, and F. Rougemont. Liège: Université de Liège: 431–40.

Mumford, L. 1966. *The City in History: Its Origins, Its Transformations, and Its Prospects*. Harmondsworth: Penguin.

Nakassis, D., W. Parkinson, and M. Galaty. 2011. 'Redistributive Economies from a Theoretical and Cross-Cultural Perspective'. *American Journal of Archaeology* 115.2: 177–84.

Nicholas, D. 1997. *The Growth of the Medieval City: From Late Antiquity to the Early Fourteenth Century*. London: Longman.

Nielsen, I. 1999. *Hellenistic Palaces*. Aarhus: Aarhus University Press.

North, D. 1981. *Structure and Change in Economic History*. London: W.W. Norton.

Novák, M. 1994. 'Eine Typologie der Wohnhäuser von Nuzi'. *Baghdader Mitteilungen* 25: 341–446.

Novák, M. 1999a. 'The Architecture of Nuzi and Its Significance in the Architectural History of Mesopotamia'. In *Nuzi at Seventy-Five*, edited by D. Owen and G. Wilhelm. Bethesda, MD: CDL Press: 123–40.

Novák, M. 1999b. *Herrschaftsform und Stadtbaukunst: Programmatik im mesopotamischen Residenzstadtbau von Agade bis Surra man'ra.* (Schriften zur vorderasiatischen Archäologie 7.) Saarbrücken: Saarbrücker Druckerei und Verlag.

Novák, M. 2004. 'Ashur to Nineveh: The Assyrian Town-Planning Programme'. *Iraq* 66: 177–85.

O'Connor, D. 1998. 'The City and the World: Worldview and Built Forms in the Reign of Amenhotep III'. In *Amenhotep III: Perspectives on his Reign*, edited by D. O'Connor and E. Cline. Ann Arbor, MI: University of Michigan Press: 125–72.

Osborne, R. and B. Cunliffe (eds). 2005. *Mediterranean Urbanization, 800–600 BC.* Oxford: Oxford University Press.

Otto, A. 2006. *Alltag und Gesellschaft zur Spätbronzezeit: eine Fallstudie aus Tall Bazi (Syrien).* Turnhout: Brepols.

Otto, A. 2012. 'Archaeological Evidence for Collective Governance along the Upper Syrian Euphrates during the Late and Middle Bronze Age'. In *Organization, Representation, and Symbols of Power in the Ancient Near East*, edited by G. Wilhelm. Winona Lake, IN: Eisenbrauns: 87–99.

Palyvou, C. 2002. 'Central Courts: The Supremacy of the Void'. In *Monuments of Minos. Rethinking the Minoan Palaces* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 167–77.

Pardee, D. 2002. *Ritual and Cult at Ugarit.* Atlanta, GA: Society of Biblical Literature.

Parkins, H. (ed.). 1997a. *Roman Urbanism: Beyond the Consumer City*. London: Routledge.

Parkins, H. 1997b. 'The "Consumer City" Domesticated? The Roman city in Elite Economic Strategies'. In *Roman Urbanism: Beyond the Consumer City*, edited by H. Parkins. London: Routledge: 81–111.

Parkinson, W., D. Nakassis, and M. Galaty. 2013. 'Crafts, Specialists and Markets in Mycenaean Greece: Introduction'. *American Journal of Archaeology* 117.3: 413–22.

Peatfield, A. 1987. 'Palace and Peak: The Political and Religious Relationship between Palaces and Peak Sanctuaries'. In *The Function of the Minoan Palaces: Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska institutet i Athen: 89–93.

Peatfield, A. 1990. 'Minoan Peak Sanctuaries: History and Society'. *Opuscula Athenensia* 18: 117–32.

Pfalzner, P. 2001. *Haus und Haushalt: Wohnformen des dritten Jahrtausends vor Christus in Nordmesopotamia.* Mainz am Rhein: Philipp von Zabern.

Poehler, E., M. Flohr, and K. Cole. 2011. *Pompeii: Art, Industry and Infrastructure.* Oxford: Oxbow Books.

Postgate, J. N. 1983. *The West Mound Surface Clearance.* London: British School of Archaeology in Iraq.

Postgate, J. N. 1992. *Early Mesopotamia: Society and Economy at the Dawn of History.* London: Routledge.

Poursat, J.-C. 1983. 'Ateliers et sanctuaires à Malia: nouvelles données sur l'organisation sociale à l'époque des premiers palais'. In *Minoan Society. Proceedings of the Cambridge Colloquium 1981*, edited by O. Krzyszkowska and L. Nixon. Bristol: Bristol Classical Press: 277–81.

Poursat, J.-C. 1988. 'La ville minoenne de Malia: recherches et publications récentes'. *Revue archéologique* 1: 61–82.

Poursat, J.-C. 1996. *Fouilles exécutées à Malia: Le quartier Mu III. Artisans minoens: Les maisons-ateliers du quartier Mu.* Athens: École Française d'Athènes.

Privitera, S. 2014. 'Long-Term Grain Storage and Political Economy in Bronze Age Crete: Contextualizing Ayia Triada's Silo Complexes'. *American Journal of Archaeology* 118.3: 429–49.

Pullen, D. 2010. *Political Economies of the Aegean Bronze Age.* Oxford: Oxbow Books.

Purcell, N. 2007. 'Urban Spaces and Central Places: The Roman World'. In *Classical Archaeology*, edited by S. Alcock and R. Osborne. Oxford: Blackwell: 182–202.

Redfield, R. 1953. *The Primitive World and its Transformations.* Oxford: Oxford University Press.

Renfrew, C. 1972. *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium B.C.* London: Methuen.

Renger, J. 1979. 'Interaction of Temple, Palace and "Private Enterprise" in the Old Babylonian Economy'. In *State and Temple Economy in the Ancient Near East*, Vol. 1, edited by E. Lipinski. Leuven: Departement Oriëntalistiek: 249–56.

Renger, J. 1990. 'Different Economic Spheres in the Urban Economy of Ancient Mesopotamia'. In *The Town as Regional Economic Centre in the Ancient Near East*, edited by E. Aerts and H. Klengel. Leuven: Leuven University Press: 20–8.

Renger, J. 1994. 'On Economic Structures in Ancient Mesopotamia: Part One'. *Orientalia* 63.3: 157–208.

Renger, J. 2007. 'Economy of Ancient Mesopotamia'. In *The Babylonian World*, edited by G. Leick. London: Routledge: 187–97.

Ringrose, D. 1998. 'Capital Cities, Urbanization and Modernization in Early Modern Europe'. *Journal of Urban History* 24.2: 155–83.

Ristvet, L. 2011. 'Travel and the Making of North Mesopotamian Polities'. *Bulletin of the American Schools of Oriental Research* 361: 1–31.

Roberts, B. 1996. *Landscapes of Settlement: Prehistory to the Present.* London: Routledge.

Routledge, C. 1997. 'Temple as the Center in Ancient Egyptian Urbanism'. In *Urbanism in Antiquity: From Mesopotamia to Crete*, edited by W. Aufrecht, N. Mirau, and S. Gauley. Sheffield: Sheffield Academic Press: 221–35.

Sanders, W. and R. Santley. 1983. 'A Tale of Three Cities: Energetics and Urbanization in Pre-Hispanic Central Mexico'. In *Prehistoric Settlement Patterns: Essays in Honor of Gordon R. Willey*, edited by R. Leventhal and A. Kolata. Cambridge: Peabody Museum of Archaeology and Ethnology: 243–91.

Scheidel, W. 2001. 'Roman Age Structure: Evidence and Models'. *Journal of Roman Studies* 91: 1–26.

Scheidel, W. 2004. 'Demographic and Economic Development in the Ancient Mediterranean World'. *Journal of Institutional and Theoretical Economics* 160.4: 743–57.

Scheidel, W. (ed.). 2012. *The Roman Economy.* Cambridge: Cambridge University Press.

Scheidel, W. and S. Friesen. 2009. 'The Size of the Economy and the Distribution of Income in the Roman Empire'. *Journal of Roman Studies* 99: 61–91.

Scheidel, W., I. Morris, and R. Saller (eds). 2007. *The Cambridge Economic History of the Greco-Roman World.* Cambridge: Cambridge University Press.

Schloen, D. 2001. *The House of the Father as Fact and Symbol: Patrimonialism in Ugarit and the Ancient Near East*. Vol. 1. Winona Lake, IN: Eisenbrauns.

Schoep, I. 2002a. *The Administration of Neopalatial Crete: A Critical Assessment of the Linear A Tablets and their Role in the Administrative Process*. Salamanca: Ediciones Universidad de Salamanca.

Schoep, I. 2002b. Social and Political Organization on Crete in the Proto-Palatial Period: The Case of Middle Minoan II Mallia. *Journal of Mediterranean Archaeology* 15: 101–32.

Schoep, I. 2004. 'Assessing the Role of Architecture in Conspicuous Consumption in the Middle Minoan I–II Periods'. *Oxford Journal of Archaeology* 23.3: 243–69.

Schoep, I. 2006. 'Looking beyond the First Palaces: Elites and the Agency of Power in EM III–MM II Crete'. *American Journal of Archaeology* 110.1: 37–64.

Schoep, I. 2010. 'The Minoan "Palace-Temple" Reconsidered: A Critical Assessment of the Spatial Concentration of Political, Religious and Economic Power in Bronze Age Crete'. *Journal of Mediterranean Archaeology* 23.2: 219–43.

Schofield, E. 2011. *Ayia Irini: The Western sector*. Darmstadt: Philipp von Zabern.

Shaw, I. 1985. 'A Spatial Analysis of Artefacts at El-Amarna'. In *Akten des Vierten Internationalen Agyptologen Kongresses, Munchen*, edited by S. Schoske. Hamburg: Helmut Buske: 177–86.

Shaw, I. 1992. 'Ideal Homes in Ancient Egypt: The Archaeology of Social aspiration'. *Cambridge Archaeological Journal* 2.2: 147–66.

Shaw, J. 2003. 'Palatial Proportions: A Study of the Relative Proportions between Minoan Palaces and Their Settlements'. In *Metron: Measuring the Aegean Bronze Age* (Aegaeum 24), edited by K. Foster and R. Laffineur. Liège: Université de Liège: 239–45.

Sjoberg, G. 1960. *The Pre-industrial City: Past and Present*. London: Collier Macmillan.

Smith, M. (ed.). 2003. *The Social Construction of Ancient Cities*. Washington, DC: Smithsonian Institution Press.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6: 3–47.

Smith, M. E. 2008. *Aztec City-state Capitals*. Gainesville, FL: University Press of Florida.

Smith, M. E. 2011. 'Empirical Urban Theory for Archaeologists'. *Journal of Archaeological Method and Theory* 18.3: 167–92.

Soles, J. 1995. 'The Functions of a Cosmological Center: Knossos in Palatial Crete'. In *Politeia: Society and State in the Aegean Bronze Age* (Aegaeum 12), edited by R. Laffineur and W.-D. Niemeier. Liège: Université de Liège: 405–14.

Spence, K. 2007. 'Court and Palace in Ancient Egypt: The Amarna Period and Later Eighteenth Dynasty'. In *The Court and Court Society in Ancient Monarchies*, edited by A. Spawforth. Cambridge: Cambridge University Press: 267–328.

Stein, G. 2005. '"Invisible" Social Sectors in Early Mesopotamian State Societies'. In *A Catalyst for Ideas: Anthropology and Archaeology and the Legacy of Douglas W. Schwartz*, edited by V. Scarborough. Santa Fe, NM: School of American Research: 121–48.

Steponaitis, V. 1981. 'Settlement Hierarchies and Political Complexity in Nonmarket Societies: The Formative Period of the Valley of Mexico'. *American Anthropologist* 83.2: 320–63.

Stone, E. 1987. *Nippur Neighbourhoods.* Chicago: Oriental Institute.

Stone, E. 1991. 'The Spatial Organization of Mesopotamian Cities'. In *Velles Paraules. Ancient Near Eastern Studies in Honor of Miguel Civil on the Occasion of his Sixty-fifth Birthday*, edited by P. Michalowski, P. Steinkeller, E. Stone, and R. Zettler. Barcelona: Editorial AUSA: 235–42.

Stone, E. 1995. 'The Development of Cities in Ancient Mesopotamia'. In *Civilizations of the Ancient Near East*, Vol. 1, edited by J. Sasson. New York: Scribner's: 235–48.

Stone, E. 1996. 'Houses, Households and Neighborhoods in the Old Babylonian Period: The Role of Extended Families'. In *Houses and Households in Ancient Mesopotamia: Papers Read at the 40e Rencontre Assyriologique Internationale, Leiden, July 5–8, 1993*, edited by K. Veenhof. Istanbul: Nederlands Historisch-Archaeologisch Instituut te Istanbul: 229–35.

Stone, E. 1997. 'City-States and Their Centers: The Mesopotamian Example'. In *The Archaeology of City-States: Cross-Cultural Approaches*, edited by D. Nichols and T. Charlston. Washington, DC: Smithsonian Institution Press: 15–26.

Stone, E. 2013. 'The Organisation of a Sumerian Town: The Physical Remains of Ancient Social Systems'. In *The Sumerian World*, edited by H. Crawford. London: Routledge: 156–78.

Stone, E. and B. Kemp. 2003. 'Review of *The House of the Father as Fact and Symbol: Patrimonialism in Ugarit and the Ancient Near East* by J. David Schloen'. *Cambridge Archaeological Journal* 13.1: 121–8.

Stone, E. and P. Zimansky. 2004. *The Anatomy of a Mesopotamian City: Survey and Soundings at Mashkan-shapir.* Winona Lake, IN: Eisenbrauns.

Storey, G. (ed.). 2006. *Urbanism in the Preindustrial World: Cross-Cultural Approaches.* Tuscaloosa, AL: University of Alabama Press.

Tamm, A. 2014. 'Domestic Architecture in the Southeastern Lower Town of Tell Chuera'. In *House and Household Economies in 3rd Millennium B.C.E. Syro-Mesopotamia*, edited by F. Buccellati, T. Helms, and A. Tamm. Oxford: British Archaeological Reports: 115–23.

Tatje, T. and R. Naroll. 1970. 'Two Measures of Societal Complexity: An Empirical Cross-Cultural Study'. In *A Handbook of Method in Cultural Anthropology*, edited by R. Naroll and R. Cohen. Garden City, NY: Natural History Press: 766–833.

Tietze, C. 1985. 'Amarna-Analyse der Wohnhäuser und soziale Struktur der Stadbewohner'. *Zeitschrift für Ägyptische Sprache und Altertumskunde* 112: 48–84.

Tietze, C. 2010. *Amarna: Lebensräume—Lebensbilder—Weltbilder.* Weimar: Arcus-Verlag.

Todaro, S. and S. Di Tonto. 2008. 'The Neolithic Settlement of Phaistos Revisited: Evidence for Ceremonial Activity on the Eve of the Bronze Age'. In *Escaping the Labyrinth: The Cretan Neolithic in Context*, edited by V. Isaakidou and P. Tomkins. Oxford: Oxbow Books: 177–90.

Tomkins, P. 2012. 'Behind the Horizon: Reconsidering the Genesis and Function of the "First Palace" at Knossos (Final Neolithic IV–Middle Minoan IB)'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and*

Middle Bronze Age, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 32–80.

Tosi, M. 1984. 'The Notion of Craft Specialization and Its Representation in the Archaeological Record of Early States in the Turanian Basin'. In *Marxist Perspectives in Archaeology*, edited by M. Spriggs. Cambridge: Cambridge University Press: 22–52.

Trigger, B. 1990. 'Monumental Architecture: A Thermodynamic Explanation of Symbolic Behaviour'. *World Archaeology* 22.2: 119–32.

Ur, J. 2014. 'Households and the Emergence of Cities in Ancient Mesopotamia'. *Cambridge Archaeological Journal* 24.2: 249–68.

van Driel, G. 2000. 'Institutional and Non-Institutional Economy in Ancient Mesopotamia'. In *Interdependency of Institutions and Private Entrepreneurs. Proceedings of the 2nd MOS Symposium, Leiden, December 11–12, 1998*, edited by A. Bongenaar. Leiden: Nederlands Historisch-Archaeologisch Instituut: 5–23.

van Effenterre, H. 1980. *Le palais de Malia et la cité minoenne.* Rome: Edizioni Dell'Ateneo.

van Effenterre, H. 1990. 'La notion de "ville" dans la préhistoire égéenne'. In *L' habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Athens: École Française d'Athènes: 485–91.

van Soldt, W. 2000. 'Private Archives at Ugarit'. In *Interdependency of Institutions and Private Entrepreneurs*, edited by A. Bongenaar. Leiden: Nederlands Historisch-Archaeologisch Instutuut te Istanbul: 229–45.

Vermeulen, F., G.-J. Burgers, S. Keay, and C. Corsi (eds). 2012. *Urban Landscape Survey in Italy and the Mediterranean.* Oxford: Oxbow Books.

von Dassow, E. 2008. *State and Society in the Late Bronze Age: Alalaḫ Under the Mittani Empire*. Bethesda, MD: CDL Press.

Voutsaki, S. and J. Killen. 2001. *Economy and Politics in the Mycenaean Palace States.* Cambridge: Cambridge Philological Society.

Wallace-Hadrill, A. 1994. *Houses and Society in Pompeii and Herculaneum.* Princeton, NJ: Princeton University Press.

Warren, P. 1994. 'The Minoan roads of Knossos'. In *Knossos: A Labyrinth of History. Papers Presented in Honour of Sinclair Hood*, edited by D. Evely, H. Hughes-Brock, and N. Momigliano. Oxford: Oxbow Books: 189–210.

Watrous, V., D. Hadzi-Vallianou, and H. Blitzer (eds). 2004. *The Plain of Phaistos: Cycles of Social Complexity in the Mesara Region of Crete.* Los Angeles: Cotsen Institute of Archaeology.

Watrous, V., D. Haggis, K. Nowicki, N. Vogeikoff-Brogan, and M. Schultz. 2012. *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity.* Philadelphia, PA: INSTAP Academic Press.

Watrous, V. and A. Heimroth. 2011. 'Household Industries of Late Minoan IB Gournia and the Socioeconomic Status of the Town'. In *Στέγα: The Archaeology of Houses and Households in Ancient Crete*, edited by K. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ, American School of Classical Studies at Athens: 199–222.

Weber, M. 1958. *The City.* New York: Free Press.

Whitelaw, T. 2000. 'Settlement Instability and Landscape Degradation in the Southern Aegean in the Third Millennium BC'. In *Landscape and Land Use in Postglacial Greece*, edited by P. Halstead and C. Frederick. Sheffield: Sheffield Academic Press: 135–61.

Whitelaw, T. 2001a. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Whitelaw, T. 2001b. 'Reading Between the Tablets: Assessing Mycenaean Palatial Involvement in Ceramic Production and Consumption'. In *Economy and Politics in the Mycenaean Palace States*, edited by S. Voutsaki and J. Killen. Cambridge: Cambridge Philological Society: 51–79.

Whitelaw, T. 2004. 'Estimating the Population of Neopalatial Knossos'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 147–58.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 114–76.

Whitelaw, T. Forthcoming A. 'Recognising Polities in Prehistoric Crete'. In *From the Foundations to the Legacy of Minoan Society. Papers in Honour of Keith Branigan*, edited by M. Relaki and Y. Papadatos. Oxford: Oxbow Books.

Whitelaw, T. Forthcoming B. 'Feeding Knossos: Exploring Economic and Logistical Implications of Urbanism on Prehistoric Crete'. In *The Country in the City*, edited by D. Garcia, R. Orgeolet, M. Pomadère, and J. Zurbach. Oxford: Archeopress.

Whittaker, R. 1995. 'Do Theories of the Ancient City Matter?' In *Urban Society in Roman Italy*, edited by T. Cornell and K. Lomas. London: UCL Press: 9–26.

Wilkinson, T. 1994. 'The Structure and Dynamics of Dry-Farming States in Upper Mesopotamia'. *Current Anthropology* 35.5: 483–520.

Wirth, L. 1938. 'Urbanism as a Way of Life'. *American Journal of Sociology* 44.1: 1–24.

Wright, H. 2000. 'Modelling Tributary Economies and Hierarchical Polities'. In *Cultural Evolution. Contemporary Viewpoints*, edited by G. Feinman and L. Manzanilla. New York: Plenum: 197–213.

Yoffee, N. (ed.). 2015. *The Cambridge World History*: Vol. 3: *Early Cities in Comparative Perspective, 4000 BCE–1200 CE*. Cambridge: Cambridge University Press.

Yoffee, N. 2016. 'The Power of Infrastructures: A Counternarrative and a Speculation'. *Journal of Archaeological Method and Theory* 23.4: 1053–65.

Yon, M. 2006. *The City of Ugarit at Ras Shamra*. Winona Lake, IN: Eisenbrauns.

8

Minoan Group Design

The ‘View from the Bridge’

Clairy Palyvou

8.1. POLY-PARAMETRIC PROBLEM SOLVING

The aim of this chapter is to address the so-called Minoan Palace as a design object. To detect and unfold, in other words, the design logic that produced this hybrid configuration standing somewhere between a large building and an urban compound.

As a starting point, it is pertinent to emphasize that the production of built space is a dynamic process involving poly-parametric problem solving. It requires formulating the tasks, checking requirements versus constraints, evaluating tolerance and capacity, and finally making choices and decisions based on optimization. Planning and designing architectural space, in other words, is a nebulous task, notoriously difficult to capture, describe, or teach for that matter.[1] In Rowe’s (1982: 18) lucid account, it has ‘“wicked problems”: they have no definitive formulation, no explicit “stopping rule”, they have more than one plausible explanation, and their solutions cannot be strictly correct or false’. Moreover, this procedure does not take place once and for all. It is re-enacted every time one interferes with a work of architecture, even if only to whitewash a wall or block a door. Since buildings, as a rule, survive their original creators and users by several generations, such interventions are frequent and vary in scale, in compliance with the life cycles that the building will serve till it exists no more or has become the object of archaeological investigation.[2]

With such variety of intertwined and obscured parameters at play, one wonders: what sort of answers do archaeologists expect to find from the surviving remnants of the architectural palimpsest they are dealing with? Is it because of the innate difficulties in capturing and analysing the dynamic process of architectural production that we have lingered for too long over the static data of the end product (see chapter 1)?

The situation however is not that hopeless, for 'architecture is not the field of creative freedom some have imagined it to be, but a system of rules for giving society what it expects in the way of architecture' (Eco 1997: 194). The architect or master mind, in other words, is but the agent who works to satisfy the needs of the commissioner within the norms imposed by their common social framework. In tradition-oriented societies, typical for the prehistoric era, this system of rules is based on 'already worked-out solutions, codifications yielding standardized messages' (Eco 1997: 194) shared by all the members of the community.[3]

It is this elusive system of rules that archaeologists are after, in the hope that it will reveal the underlying system of the lifestyle of the era in question, which is the ultimate goal of any archaeological research. The two systems are directly related for the task of architecture, as Giedion (1971: xxxiii) defined it long ago, is to serve and interpret as best as possible a way of life valid for a period. To arrive at this system of rules, however, one has to reverse the process of architectural creation and unwind its life cycles. The tools for such an undertaking can be none other than those used to guide the production process. One could argue, for example, that space syntax works both for planning and designing the future as much as for decoding the past (Hillier and Hanson 1984; Hillier 1996; Hanson 1998; for references in archaeology see Cutting 2003, 2006; Letesson 2009: 13–16; 2013: 312–16). In accepting Hillier and Hanson's analytical method as valid for any period of time in history, Yiannouli (1992: 43) rightly notes that in architecture more recent is not necessarily more unambiguous and 'the older is not necessarily the more alien'.

But which tools are most appropriate for such a task? Broadly speaking, there are two predominant conceptual frameworks one can choose from: the analytical or configurational based largely on computational analysis, and the holistic or phenomenological. The two seem to compete with one other and the rift between them has taken serious dimensions at times. Today, however, there are many who speak in favour of bridging the two sides, a stance I totally concur with.[4] Theories, after all, are not cults: one man's theory is not another man's heresy. Nor does choosing one theoretical tool necessarily result in renouncing the other.

The best way to appreciate the two theoretical models, in fact, is by reading how one side sees the other. Two very interesting articles of this sort, written by leading exponents of the two schools (Hillier 2005 and Seamon 1994) explore at length the benefits and constraints of the other side. In Hillier's (2005: 3) words, one needs to take 'the view from the bridge, from which both sides can be seen with comparable clarity'. Though a devout phenomenologist myself, I therefore decided to stand on the bridge and look into ways I could benefit from the analytical school of thought.

8.2. DIFFERENTIATION AND TRANSITION

One of the issues that both sides of the bridge seem strongly interested in is the relationship between parts and whole. According to Hillier (2005: 6), 'Although we experience cities a bit at a time, our sense of the city does not reflect this fragmentation. On the contrary, our sense of a city is made up of a sense of its differentiated parts and the transitions between them.' Differentiation and transition are, indeed, two very crucial notions in our studies. But how are they to be understood in such a complex environment as the city?

A possible answer to this question is given by Read and Gil (2013). They argue that there are two ways of reading the parts and the whole in an urban environment: as nested areas and as overlaid grids (Read and Gil 2013: 051:5–051:6) (Fig. 8.1). They conclude that understanding the complexity of spatialization of cities and neighbourhoods requires taking into account both, for they supplement one another. Nested areas correspond to what they call areal definition of bounded areas and circles within circles (Read and Gil 2013: 051:5). It is a familiar way of mapping differentiated parts grouped according to relevance. Transitions, in this case, are to be sought at the boundaries of each area or circle. This was, for example, Preziosi's (1983) approach to Minoan architectural design.

Overlaid grids, on the other hand, correspond to the network definition of a grid system that consists of several layers of grids of streets, on top of one another, ranging from the lower level of local streets to the intermediate level of the neighbourhood and finally to the 'supergrid', which consists of the main streets that carry heavy traffic and have a more public role (Read and Gil

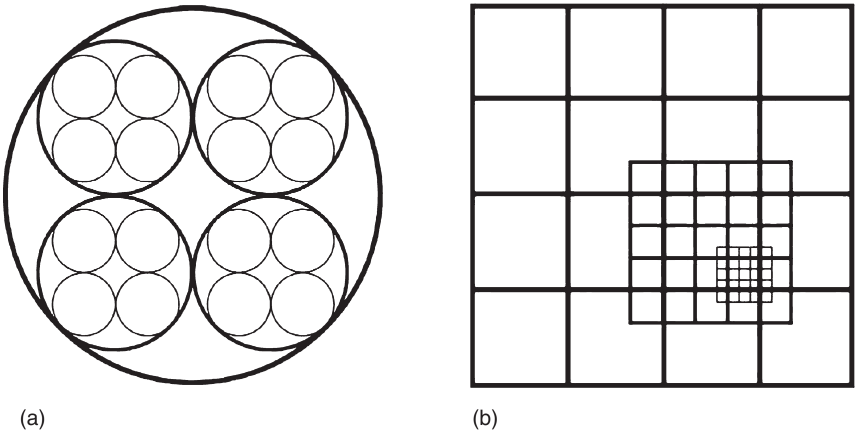

Fig. 8.1. (a) Bounded areas; (b) overlaid grids (adapted by the author from Read and Gil 2013: figs 2 and 3, with permission).

2013). The supergrid plays an important role for the life of the city, both for the everyday transactions of its citizens and the perception of the city's image by its visitors.

The various levels of the grid reflect a nested hierarchical structure, but the corresponding diagram is not that of the bounded areas and circles within circles but rather that of grids laid over grids (Read and Gil 2013: 051:4–051:5). It is important to note that parts of the street grid belong to all three levels simultaneously. Hence, our understanding of differentiation and transition is based on context. These two approaches to the built environment, combined as argued by Read and Gil (2013), may prove a useful tool for looking into Minoan towns and palaces, as we shall see in section 8.4.

Read and Gil (2013) further explain that differentiation and transition are linked to the way we perceive being inside or outside a system. In the areal definition, space is divided into insides and outsides by boundaries. According to the network definition, on the other hand, 'a structure of "insideness" may be understood in relation to the logic or sense internalized as "context" in the network and things outside the network will not join in this sense-making logic, though they may make sense in entirely different networks. . . . The experience of being in the city, in this case, is delivered by the supergrid, while the experience of being in the neighbourhood is delivered by the regular grid' (Read and Gil 2013: 051:6). This verticality of levels is scale as we understand and live it in our everyday lives.

The two modes of spatial differentiation and transition discussed above reflect different social structures. The bounded areas, in which transition is controlled by a limited number of peripheral points of communication, correspond to segregated communities. The Mesopotamian city of Ur is an example of bounded areas and circles within circles that clearly reflect a segregated community (Fig. 8.2). Within the broader circle, marked by the city-wall, there are two strictly bounded and distinct areas that correspond to the populace and the rulers respectively. The former is a dense homogenous fabric of houses with very little public space among them other than the narrow streets. In this bounded area, the street network has almost no hierarchy and accommodates only 'to movement' (to each house) and very little 'through movement'.

Such urban configuration deters gatherings, be it for celebrations or protest. Gatherings are only possible within the bounded area that corresponds to the city's theocratic administration and surplus control. This area stands in great contrast to the rest of the city. Its architectural layout has been designed so as to promote choreographic congregations, strictly defined in terms of access and movement and literally raised above the mundane domain. The focal point, the ziggurat, crowned by the temple, thrusts upwards as a powerful reminder of the hierarchy guiding the life of this segregated community. This is a typical example of architecture's immense potential for symbolism and mass manipulation.

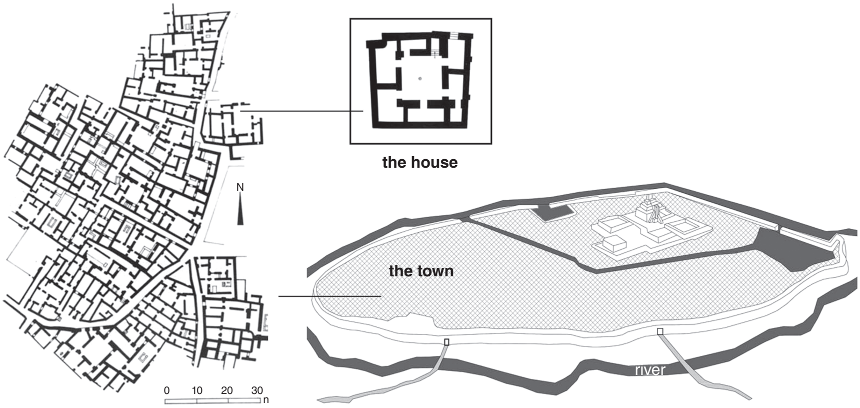

Fig. 8.2. The Mesopotamian city of Ur (house plan drawn by the author; town plan adapted by the author from Woolley 1931, plate XLVII; courtesy of Cambridge University Press).

Interestingly, a similar logic of strictly bounded areas and circulation control with very little 'through movement' also applies to the court-house typical of domestic architecture at Ur (Fig. 8.2, top left). Segregation, in other words, prevails throughout: at the level of the city it refers to class discrimination whereas at the level of domestic architecture it pertains to gender.[5] The only notion of the supergrid in the case of Ur is the waterway (the river) cutting through the city. It provides a powerful 'through movement', a kind of umbilical cord that links the city to the broader social and economic network of the region.[6]

The second mode of spatial differentiation, that of overlaid grids, corresponds to integrated communities. This is the case of most Minoan towns, such as Palaikastro, Malia, and Akrotiri, Thera (Fig. 8.3). Even though there is not sufficient data to map these towns in their totality, a cursory overview of the excavated parts and the corresponding flow of movement reveals with relative certainty the main streets that make up the supergrid. Palaikastro specifically presents an ideal case for the study of its layout and the social order it might have implied (Cunningham 2007).

8.3. TOOLS OF URBAN DESIGN

Most Minoan towns, even if only partially excavated, exhibit public spaces that are well defined. Main streets—presumably corresponding to the town's supergrid—are often easy to detect, thanks to their formal characteristics.

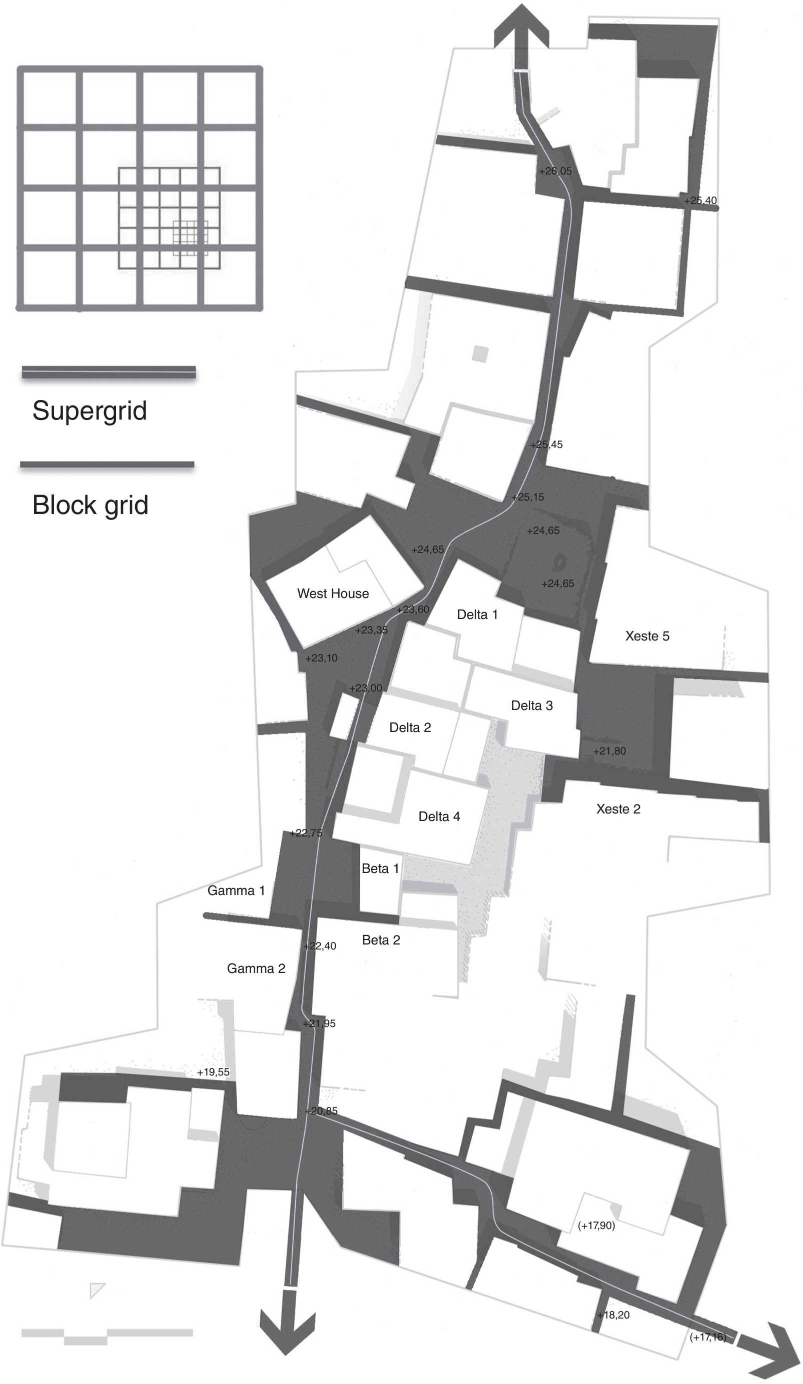

Fig. 8.3. The circulatory network of Akrotiri, Thera (drawing by the author).

Certain common practices are, indeed, clearly intended as tools of urban design, for their role is to mark out parts of the town and highlight specific streets. Such tools are: *axiality*, long streets that provide overview and 'through movement', *ashlar facades* aligned so as to promote a street front, *indentation of facades* flanking main streets, and *raised walkways*. They are all well-known features of Minoan architecture, with a long history going back to the Middle Bronze Age, and are therefore of high mnemonic value (see section 8.4).

Indentations are attested mostly along main streets and major public spaces that probably partake in the supergrid. They consist of a sequence of gradual recesses of the building facades that are often quite shallow (20–60 cm). These recesses are applied rhythmically, at relatively short distances (3–5 m), extending over several abutting houses. In the case of Akrotiri, Sector Delta, the indentation applies to four different houses built in different time periods (Palyvou 1986) (Fig. 8.4). Indentations do not always correspond to transverse walls inside the building, as one might expect (see, for example, Sector Delta, room 15, a later addition to the building). It is clear, therefore, that the indentations were designed primarily—if not exclusively—in relation to the public space outside. In other words, it is an urban regulation respected by all members of the community in all successive building activities. It is also quite possible that, in the long run, it became a morphological element in itself, signifying major street facades (Palyvou 1986: 193–4).

One of the effects of indentation is unification: the facades of juxtaposed buildings are no longer distinguished from one another; they are united in a long, undulating street front. The individuality of each building is thus subsidiary to the overall composition of the townscape and the verticality of the multi-storey unit is transformed into a horizontal zone (Fig. 8.4). The same is true for ashlar facades, as in the case of the Main Street at Palaikastro (Cunningham 2007: 102). This was surely a town planner's tool—and a conscious one for that matter—and it is all too tempting to think of it as a means towards an egalitarian treatment of the public image of the town, the image an outsider would perceive moving along the supergrid.

The effect is so characteristic of the Minoan town that it appears even in the *Town Mosaic* composition from Knossos. It consists of a number of individual plaques attached, presumably, to a flat surface. The artist has intentionally depicted the three-dimensional undulation of a street facade. He achieved this by adding actual indentations on some plaques and by varying their thickness (Fig. 8.4). The overall composition is thus presented in low relief and the message conveyed is that this is a major street facade, of the kind experienced walking along the supergrid of a real Minoan town.

One might also suggest that indentations were used as a means to deal with grid deformations. Hillier (1999: 188) writes that space syntax works even when the grid appears to be very deformed. In an earlier paper on the town plan of Akrotiri, I suggested that the indentation was a way to adjust

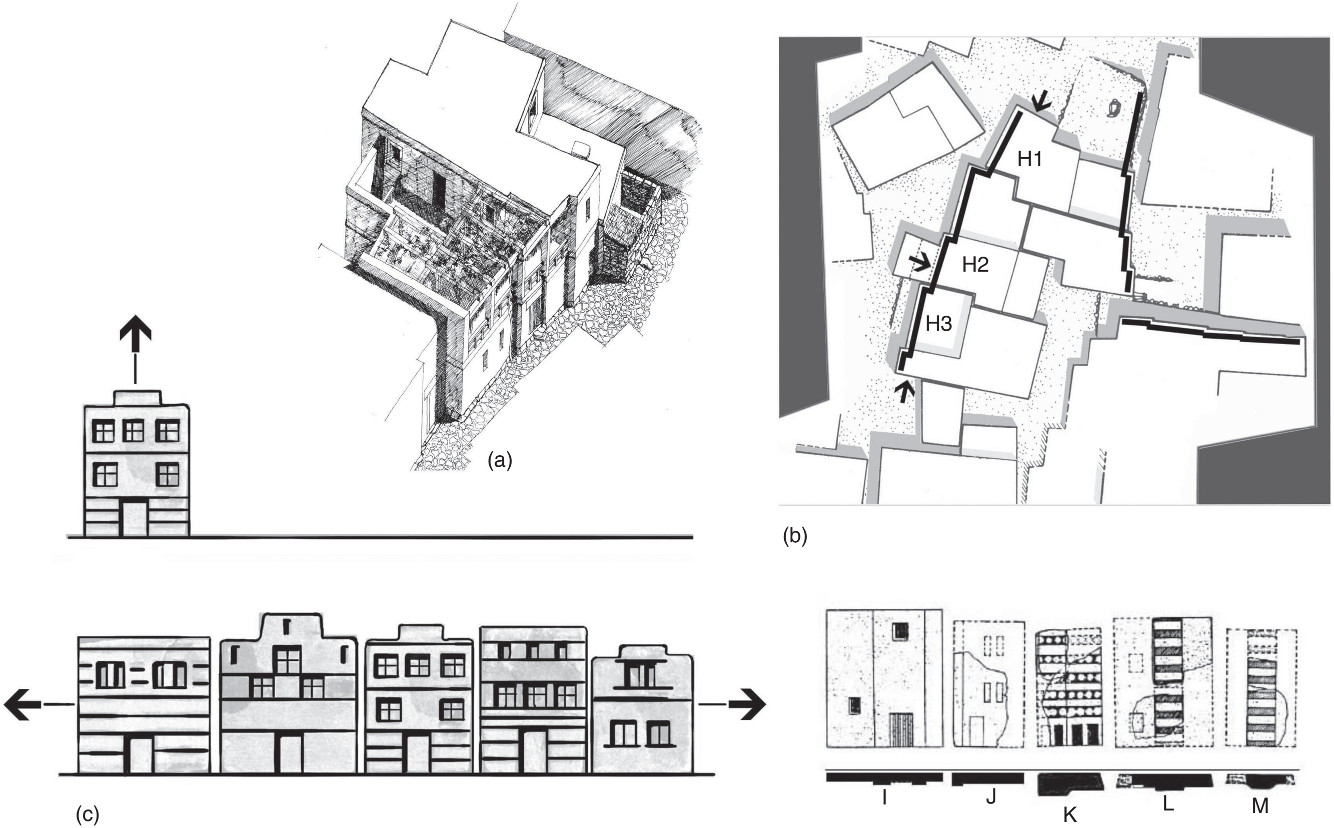

Fig. 8.4. Street facades with indentations: (a) Chania; (b) Akrotiri; (c) *Town Mosaic* from Knossos (drawing by the author).

rectilinear architecture to the contours of the land that defined the initial path, while complying to a more or less standard north–south orientation (Palyvou 1986) (Fig. 8.5). In space syntax terms, it may also be that these pronounced indentations provide sensorial cues of direction as a means to rectify corporeal deviations. The alignment of the indentations, in other words, indicates the general direction as if showing the way: 'carry on in this direction' (Hillier 1999: 173). This is relevant to what Athanasiou (2013) calls the 'spatial stimulant' that a person would have experienced walking through Akrotiri. His semiotic approach to both the ideational and interpersonal function of the urban environment has shown how information was received and accumulated.

Raised walkways are yet another tool of urban design that amplifies the supergrid. They are commonly discussed in Aegean studies in relation to the palaces as associated with ceremonial processions, but they constitute an unmistakable urban feature as well, attested in many Minoan settlements (Driessen 2009). Their explicit linear geometry emphasizes axiality and provides lines of communication that lead to and connect attraction points, both local and global. Maybe not all walkways correspond to the supergrid, but it is quite possible that all the streets belonging to the supergrid had such

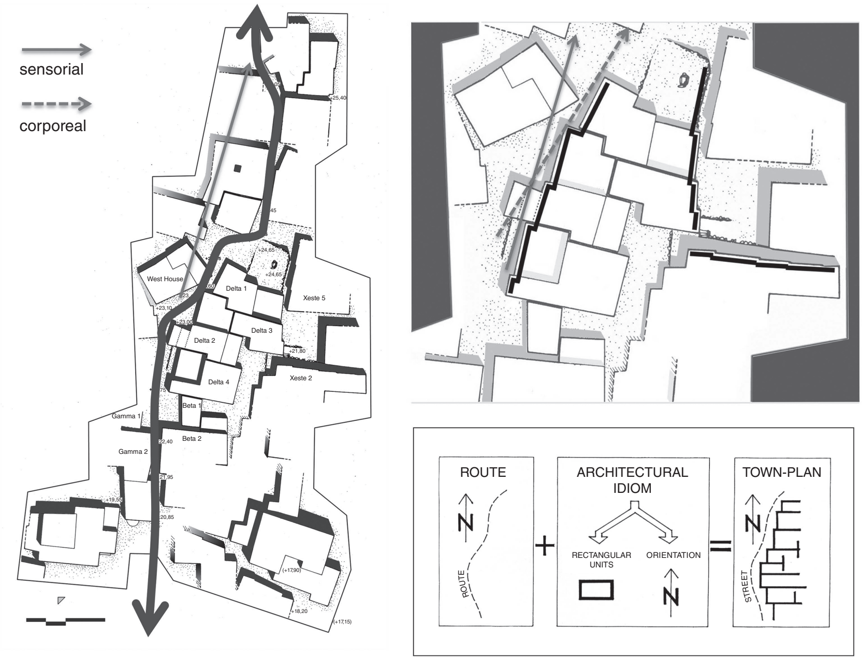

Fig. 8.5. Akrotiri, Thera: indentations as sensorial cues of direction that rectify corporeal deviations (drawing by the author).

walkways. Admittedly, however, for symbols to perform best they need to be exclusive.

The network often comprises diagonal walkways that have been interpreted in various ways. In a realm of orthogonals and right angles, as is the case of Minoan architecture, the very notion of the diagonal is an event, if not a scandal. It exists as such, nevertheless, only in relation to the system of Euclidean coordinates that the surrounding buildings provide. In other words, it is the grid concept that the diagonals eventually highlight. Their *raison d'être*, however, is largely practical for they function primarily as shortcuts that people take, consciously or not, when moving from one point of attraction to another.[7] They result from the least effort principle that comes naturally in our everyday mundane activities. This does not exclude a formal function at times. It is a matter of context, as described in section 8.2.

8.4. MINOAN GROUP DESIGN OF BOUNDED AREAS AND OVERLAID GRIDS

Let us turn now to the Minoan palace and see how these tools of space syntax can help us deal with it as a design object. As a starting point, we should be reminded that the Minoan palace is notoriously resistant to definitions, even when all we ask is to understand its design scale. As is often the case in such circumstances, it is easier to state what the palace is not: it is neither a building nor a fragment of the town fabric.[8] So, where does it stand as a design object?

To address this question we need to see how architects and town planners define the design of the multi-scalar nature of the built environment, a core concern of this volume (see chapter 1). Broadly speaking, there are four levels of design and planning, all of which are interrelated in a socio-spatial network:

- *Architectural design* applies to a single building and its immediate environment (micro-scale);
- *Urban design* or *group design* refers to a number of interrelated buildings and all the open-air spaces, private and public, that are relevant to their function (meso-scale 1);
- *Town planning* deals with public space and land use at the level of a settlement—hamlet, village, town or city (meso-scale 2);
- *Regional planning* encompasses economic and social issues besides architecture and settlement patterns (macro-scale).

The scale that fits best the Minoan palace is urban or group design. In modern terms it is used to describe the design of large compounds of special function, such as university campuses or large hospitals. In historical studies the term 'group design' was first used by Robert Scranton in 1949 to describe the correlation between sacred freestanding buildings within a classical Greek *temenos* or an agora. Giedion took over the term and defined group design as a 'spatial harmony' between independent buildings 'sculpturally related' yet 'spatially distinct' (Giedion 1971: 9, 270). Harmony (*αρμός*/seam) is understood as the way things come together, volumes in this case, and the way their interface is experienced through movement. Group design, in other words, is all about differentiation and transition, as described by Hillier (2005), Read and Gil (2013) (see section 8.2).

The above account of group design corresponds well to the Minoan palace. The main condition—independent buildings functionally related—is met by what is commonly referred to as zones or clusters. These are well defined bounded areas each one with its own distinct architectural character and formal individuality (Fig. 8.6). Storage zones, for example, consist of elongated, standardized and repetitive units; administration zones consist of small, dark cells intricately interrelated; and residential zones have a uniquely fluid, flexible, and mutable character. Some of these areas occupy one level, while others extend in the vertical, to two or more levels, as in the residential zone (Fig. 8.7). In the latter case, the staircases serving the zone are to be found at its core.

The second condition, freestanding buildings 'sculpturally related' yet 'spatially distinct', is not as evident at first glance. The constituent zones or clusters abut one another forming a more or less continuous mass of volumes. Yet, even though they are not literally freestanding, they are perceived as spatially distinct by the way they are experienced through movement. Each zone is architecturally differentiated and self-contained and moving from one zone to another is not very different from moving from one building to another. Intercommunication is served by a series of corridors and courts that form a circulatory network of overlaid grids similar to a town's network of streets and squares.

It is evident from the above that the complexity of spatialization of the Minoan palace can only be understood by a combined analysis of both bounded areas and overlaid grids, as Read and Gil (2013) recommend. Take, for example, the palace of Knossos. First, it may be mapped as a group of bounded areas with varying modes of transition between them (Fig. 8.8). This approach was already advanced by Evans (1921: 207). He called the bounded areas 'insulae' and believed them to be typical of the initial state of the palace. In these, however, he did not recognize a design concept as such; instead, he attributed different insulae to different times of construction. Graham (1972) also spoke of units or blocks, whereas Preziosi preferred the terms zones and clusters: the palace of Knossos comprising 'a set of distinct functional zones with controlled access at particular points between zones or cell clusters' (Preziosi 1983: 91, Fig. II.30). Preziosi's approach, in fact, is based almost

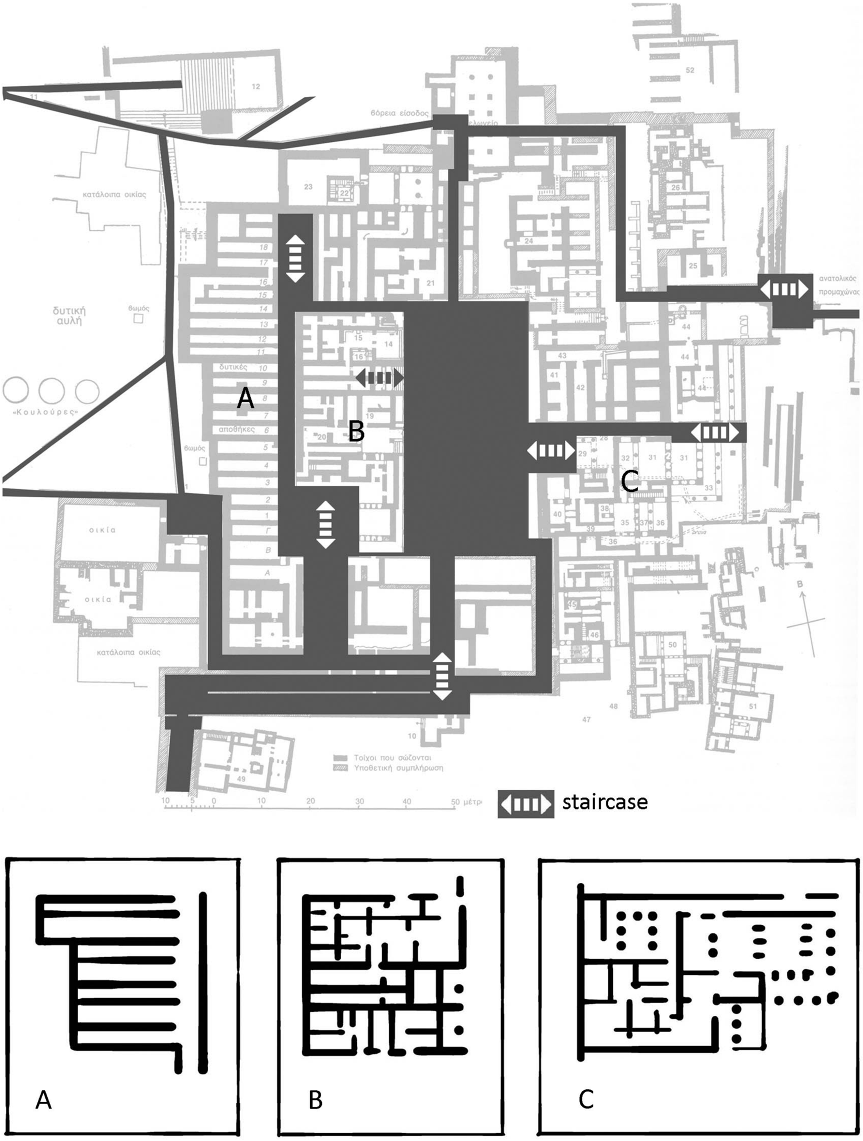

Fig. 8.6. The palace of Knossos: (a) storage zone (elongated, standardized, repetitive); (b) administration zone (small, dark, intricately interrelated); (c) residential zone (fluid, flexible, mutable) (drawing by the author).

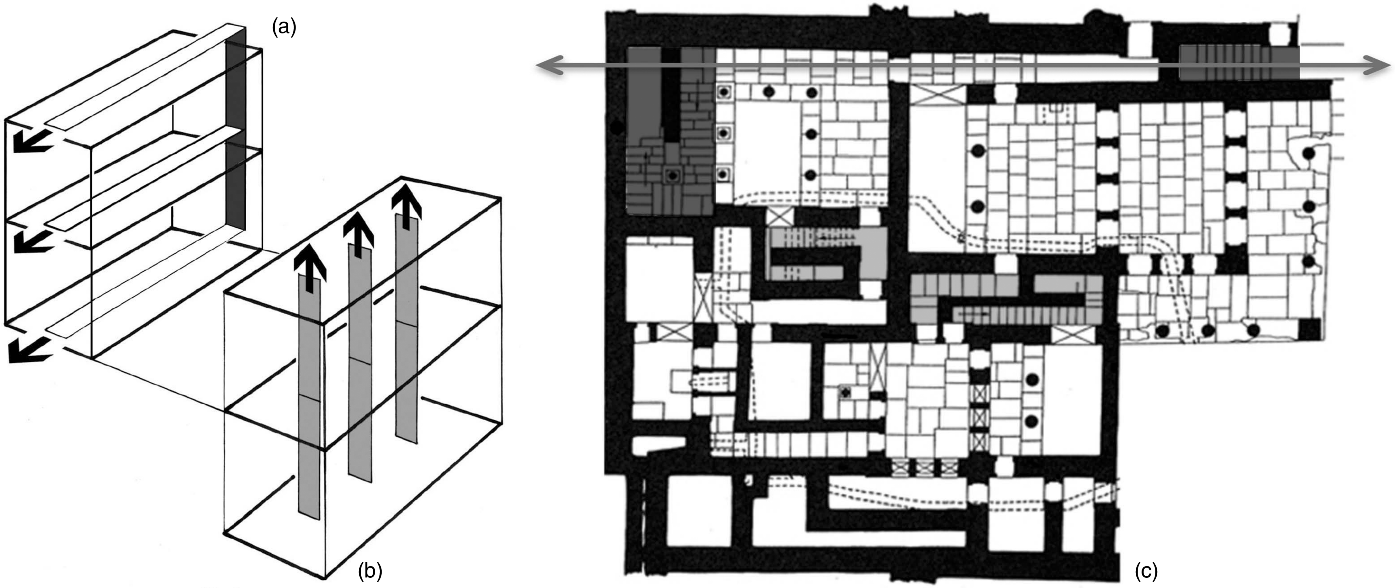

Fig. 8.7. Staircases: (a) serving zones located in different levels; (b) serving a zone distributed in two or more levels; (c) residential zone of the palace of Knossos (drawing by the author).

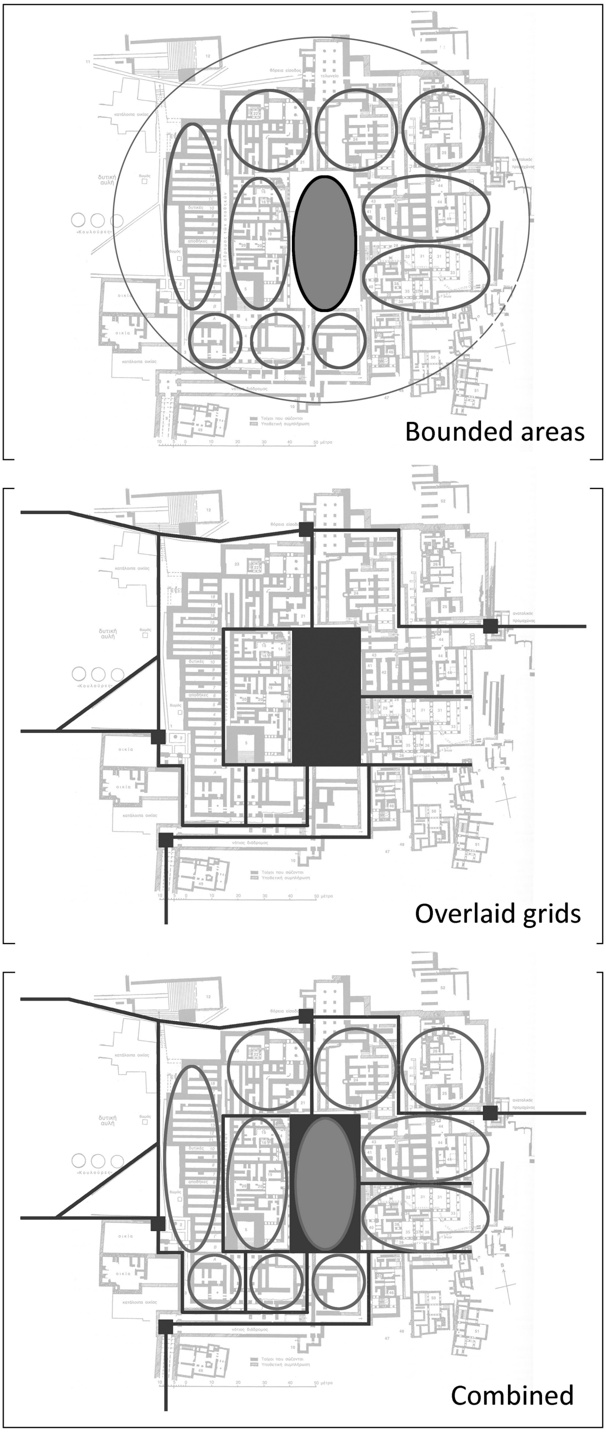

Fig. 8.8. Palace of Knossos: bounded areas and overlaid grids (drawing by the author).

exclusively on the concept of bounded areas, for in his cluster diagrams, linear circulatory spaces, such as corridors, are also represented as bounded areas.

A second way to map Knossos is to trace the circulatory network spreading over the palace (Figs 8.6 and 8.8). The outcome is a typical map of overlaid grids that reflects a nested hierarchical structure. In this map the supergrid can be inferred from the long axial corridors running in between bounded areas, in the form of sheltered streets. Evans (1921: 203) too alluded to such a supergrid by suggesting that 'the Corridors may originally have often been open gangways between these "insulae"... Very early in the Palace history, however, a process of organic fusion set in'.

An important note regarding the circulatory network of the Minoan palace is that major staircases providing access to zones located at different levels are appended to the supergrid (Fig. 8.7a). These staircases are clearly distinguished from the staircases serving parts of the same zone distributed in different levels (Fig. 8.7b). The former partake in the supergrid system, like vertical main streets so to speak, whereas the latter are entirely unassociated with the supergrid.

The result is an amazing three-dimensional supergrid that provides the key for coping with this large-scale architectural project, both in its production and its consumption (see section 8.5, mnemonic skeletons and cognitive maps). The concept of the supergrid is, indeed, fundamental to the design logic of Minoan Neopalatial architecture, be it for a palace or a mansion.[9] Tylissos, House C, for example, is arranged along a circulatory supergrid with one turn and two major staircases appended to it (compare to Preziosi's matrix of bounded areas for a different reading, Fig. 8.9).[10]

But there is more to this sophisticated space articulation, since the supergrid of the palace does not stand on its own. It is not self-contained within the boundaries of the palace; it is appended to the town's supergrid system. Proof for this is to be found at the points of transition between the town and the palace. Instead of one major entrance to the palace there are several points of access (rather than entry), in varying degrees of formal clarity and accessibility.[11] It is evident that there was no specific type of entrance to the palace encoded in the minds of the Minoan people; no clearly formulated expectations as to the form or even the location of the entrance. This explains why entrances to the Minoan palaces appear in the bibliography under a variety of names (gate, propylon, and porch) and why there is no consistency among scholars as to which is the main entrance (Palyvou 2009).[12] In fact, it is more likely that they were all main entrances to the zone they primarily served (Letesson 2009: 123–6, 167–71, and 257–60).

The West Porch of the palace of Knossos, for example, has none of the attributes of a proper entrance (Fig. 8.10). Starting from its location, it is wedged in a corner with very limited visibility from a distance, especially when moving parallel to the lateral north wall. The indented ashlar facades, the flat floor almost

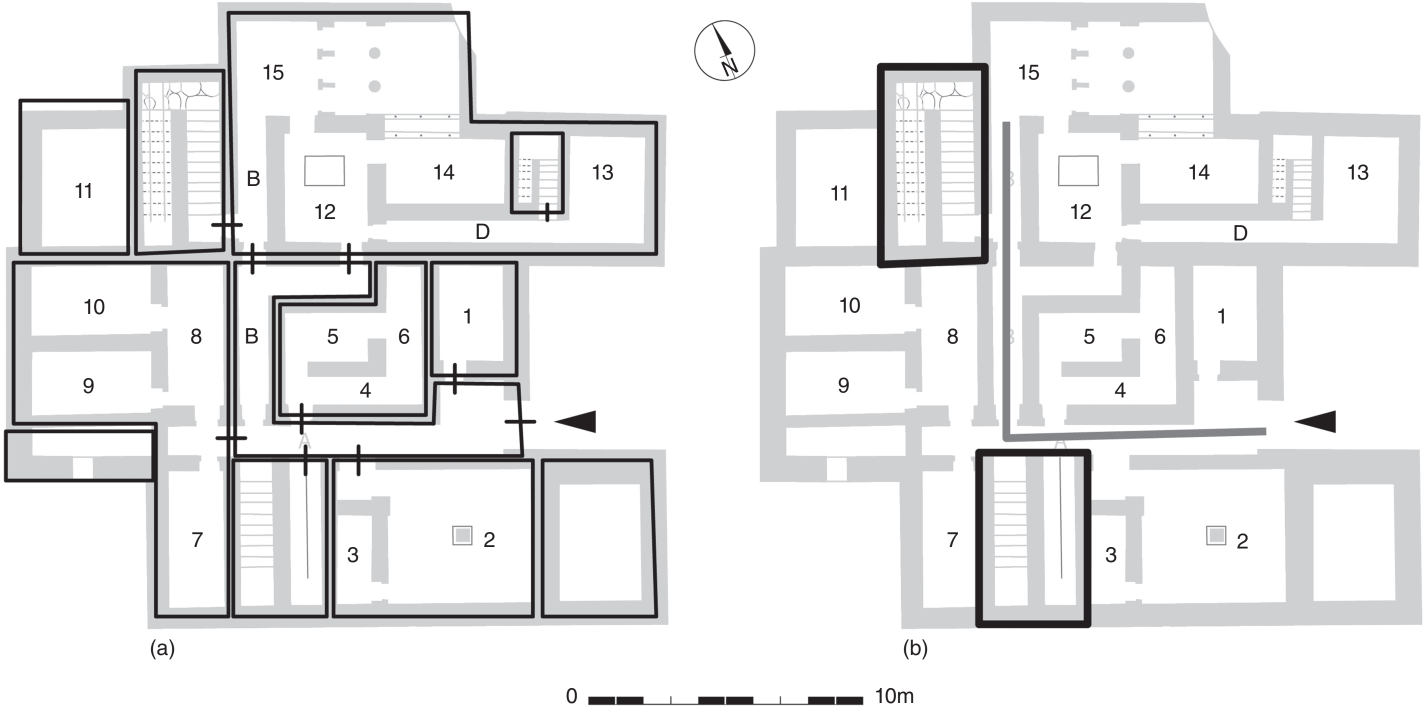

Fig. 8.9. Tylissos, House C: (a) mapped as bounded areas; (b) mapped as circulatory grid (drawing by the author).

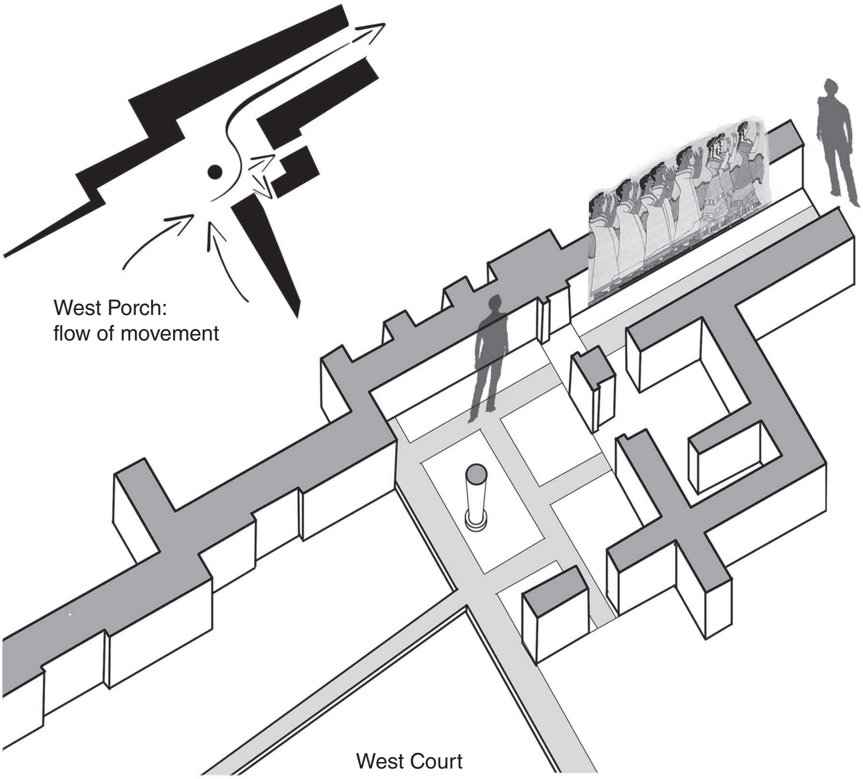

Fig. 8.10. The West Porch at the Palace of Knossos (drawing by the author).

level with the urban public space beyond, and the causeways all relate the entrance to the town's supergrid rather than to the palace as a building.

The hybrid nature of the quasi-entrance access system at Knossos is underlined most conspicuously by the urban causeways that continue straight through, all the way to the central court, running along corridors that are but interiorized streets.[13] These causeways are extensions of the town's supergrid. Once inside they are not raised any more, because there is no need for that. They do however announce explicitly that the palace's supergrid is the unobstructed continuation of the town's supergrid and that the entrance is a control node embedded in this system, a brief lingering to check and be checked.

8.5. MNEMONIC SKELETONS AND COGNITIVE MAPS

The importance of the supergrid for the coherence and intelligibility of the large and complex compound that the palace is may be further appreciated with the tools provided by the work of Peponis, yet another eminent scholar of the analytical school, specializing in the design of complex large-scale projects. According to Peponis (2012: 11), corridors, staircases, and courtyards act as references, as a means to grasp a large compound both in its parts and as a whole. This is because they have properties that are associated with cognitive and organizational performance. They provide an expansive visual field and an overview of the connections to adjoining spaces. He describes this condition as 'having purview over space': in other words, 'to be able to judge space as a potential field of access, movement, encounter, and co-presence' (Peponis 2012: 15).

Peponis uses computational analysis to show that purview spaces play an important role in the design of large compounds, such as hospitals or university campuses. As buildings get larger they also get more complex, as indicated by the increasing numbers of turns between any two locations. The increase in complexity is kept in check by at least two mechanisms (Peponis 2012: 26):

- The increase in the maximum direct purview, which implies a principle of focality, and the emergence of ever more powerful vantage points (squares/courts);
- The increase in distance per turn, which implies a principle of linearity, the creation of linearly extended direct purviews (streets/corridors).

A subject moving in a building and intuitively comparing locations for the direct purview they afford might be able to remember the particular locations that offer greater overview and link other locations to them. Overview areas, in other words, can act as a mnemonic skeleton for a cognitive map (Peponis 2012: 31).

The design of the Minoan palace seems to adhere to these two means for controlling complexity. First, the increase in the maximum direct purview is attested by the incorporation of large open air spaces, strategically distributed, culminating in the central court. This open space, strictly defined in terms of size and orientation, presents the user with very powerful vantage points. Second, the increase in distance per turn is also attested by the long corridors that run through the palace compound. The Corridor of the Procession at Knossos, starting from the west court and leading to the central court (Fig. 8.6), has only two turns in a total length of approximately 97m, and each branch is long enough to allow for its proper identification in the cognitive map (from the entrance to the central court, the three corridor segments measure 26m, 48m, and 23m respectively). Moreover, the Minoans went one step further: by appending to the mnemonic skeleton the major staircases leading to zones located on the upper floors they extended the cognitive map in the vertical as well.

8.6. THE TOWN-AND-PALACE SUPERGRID

Having mapped both the bounded areas comprising the palace and the supergrid that it shares with the town, what remains is to superimpose the two (Fig. 8.8). The emerging picture is a group design of differentiated bounded areas that come together through the town-and-palace supergrid. Transitions, in other words, are not direct points of communication between abutting boundaries but indirect lines of communication through the effect of the supergrid that corresponds to their interface.

This combined reading of Minoan architectural design, as both bounded areas and overlaid grids, has revealed to some extent the logic of the design process. The most powerful agent in this process is the town-and-palace supergrid, laid out as one continuous network of communication extending in all three dimensions. The bounded areas concept, on the other hand, is more loosely applied, as is evident by the obscure limits of certain zones, and most conspicuously by the wider outer boundary of the palace itself that often blends into the city.

The large open-air space that is the central court has a special place in this configuration for it partakes in both systems of spatialization. It belongs to the bounded areas pattern, as one of its best defined and most powerful constituent parts, and also to the system of overlaid grids, as a major circulatory node in the supergrid system. It is the absolute destination and origin of the arrest and movement sequence that runs through the town and the palace (Palyvou 2002); an attractor hot spot or point zero of the town-and-palace supergrid (Hillier 2005: 15). The central court is of the highest purview value. It is indeed only here that one can grasp the totality that is the palace and at the same time identify its constituent parts. The latter is made possible by the formal differentiation of the surrounding facades, according to the zone they correspond to. The Minoan palace, therefore, can only be understood as a constituent part of the town, incorporated organically in a wider geographical concentration. Incorporated—as opposed to embedded—means that differentiation between the palace and the town was kept minimal and that transition was implicit rather than explicit.

To conclude, though I have not indulged in computational analysis, which would have been the true use of space syntax tools, I have attempted to understand and exploit their logic in ways that are friendly to the other side of the bridge, where I reside. As is often the case, understanding is a major step towards appreciation and reconciliation. I must therefore admit that the analytical school's clarity of reasoning is, in itself, a potent tool for it encourages the mind to follow lines of thought in a disciplined manner, an approach of great value when it comes to analysing a remote and elusive past. At the end of the day, however, looking down to the flow of the river running under the bridge I am standing on, what I see is material from both banks tumbling down into the water and merging in one powerful flux moving in the same direction.

ACKNOWLEDGEMENTS

I would like to commend Professor Carl Knappett and Marie Curie International Outgoing Postdoctoral Fellow Quentin Letesson for organizing an international meeting of high standards on the topic of Minoan Architecture and Urbanism and for their meticulous work in editing this volume. I am especially indebted to Quentin Letesson for his comments and his generous help in providing bibliographic references.

NOTES

1. See, for example, Broadbent's (1980) four kinds of design: the *pragmatic*, the *iconic*, the *geometric*, and the *analogical.*
2. See Driessen's (1995) account of architectural adaptations to changing sociocultural conditions.
3. This procedure has been described in many different ways (Palyvou 1990: 44–56). Norberg-Schulz, for example, speaks of 'theme and variation' (Norberg-Schulz 1980: 180). Letesson's (2009) 'genotypes and phenotypes' are also on the same line of thought: the genotype is the underlying common structure, whereas the phenotypes are its varying physical expressions.
4. David Seamon (1994, 2013), an environment-behaviour researcher and prolific writer on phenomenology, explains at length his interest in Hillier's space syntax, noting that this may sound bizarre to some. See also Letesson 2009: 5–22.
5. Rapoport (1969: 81–2) argues that this type of house is prevalent throughout the world 'in cultures which are both crowded and hierarchic'; it also provides space for outdoor activities protected from indiscreet eyes.
6. Compare with Amsterdam (Read and Gil 2013: 051:6).
7. They are also known as 'elephant paths' or 'desire lines'. See, for example, how quickly new pathways emerge when streets and sidewalks disappear for days under a thick layer of snow.
8. Buildings are commonly defined as 'arrangements of boundaries that demarcate interior space according to the organization of human life and activity. A building is usually a continuously connected interior' (Peponis 2012: 11).
9. More on the topics discussed in this paper will appear in my book 'Daidalos at Work: A Phenomenological Approach to Minoan Architecture' under publication by INSTAP Press.

10. Preziosi's use of the word 'grid' is of a different nature: he refers to a modular grid, laid out on the ground with ropes and pegs, as a means to guide the design and the construction of a Minoan building (Preziosi 1983: 11).
11. See Driessen's (1997) detailed account of the access systems of the Minoan palaces.
12. See, for example, Graham's (1972) ambiguity in describing the entrances to the palaces of Knossos (28–9), Malia (44), and Phaistos (36–41). The Grand Propylon at Phaistos, in particular, has raised several questions as to its status, mostly because of the inconsistency between its size and what lies beyond. Van Effenterre (1987: 85–7) does not think of it as a main entrance and neither does Preziosi (1983: 127).
13. The way the causeways branch out in different directions within the limited space of the entrance porch results in congestion. Too much information for the incomer ends up in confusion. The fact that the area has gone through modifications does not alter the effect because the way we see it today is how visitors would have experienced this entrance in the Minoan era for a long time.

REFERENCES

Athanasiou, K. 2013. 'Semiotic Approaches for the Study of the Urban Environment of the Late Bronze Age Settlement of Akrotiri on Thera'. In *Space and Time in Mediterranean Prehistory*, edited by S. Souvatzi and A. Hadji. London: Routledge: 246–67.

Broadbent, G. 1980. 'The Deep Structures of Architecture'. In *Signs, Symbols, and Architecture*, edited by G. Broadbent, R. Bunt, and C. Jenks. Chichester: John Wiley and Sons: 119–68.

Cunningham, T. 2007. 'In the Shadows of Kastri: An Examination of Domestic and Civic Space at Palaikastro (Crete)'. In *Building Communities: House, Settlement and Society in the Aegean and Beyond* (*British School at Athens Studies* 15), edited by R. Westgate, N Fisher, and J. Whitley. London: British School at Athens: 99–109.

Cutting, M. 2003. 'The Use of Spatial Analysis to Study Prehistoric Settlement Architecture'. *Oxford Journal of Archaeology* 22.1: 1–21.

Cutting, M. 2006. 'More Than One Way to Study a Building: Approaches to Prehistoric Household and Settlement Space'. *Oxford Journal of Archaeology* 25.3: 225–46.

Driessen, J. 1995. 'Crisis Architecture? Some Observations on Architectural Adaptations as Immediate Responses to Changing Socio-Cultural Conditions'. *Topoi* 5: 63–88.

Driessen, J. 1997. 'Observations on the Modification of the Access Systems of Minoan Palaces'. *Aegean Archaeology* 2: 67–85.

Driessen, J. 2009. 'Daidalos' Designs and Ariadne's Threads: Minoan Towns as Places of Interaction'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 41–54.

Eco, U. 1997. 'Function and Sign: The Semiotics of Architecture'. In *Rethinking Architecture, A Reader in Cultural Theory*, edited by N. Leach. Routledge: London: 182–204.

Evans, A. 1921. *The Palace of Minos at Knossos*. Vol. 1. London: Macmillan.

Giedion, S. 1971. *Architecture and the Phenomena of Transition: The Three Space Conceptions in Architecture*. Cambridge, MA: Harvard University Press.

Graham, J. W. 1972. *The Palaces of Crete*. 2nd edn. Princeton, NJ: Princeton University Press.

Hanson, J. 1998. *Decoding Homes and Houses*. Cambridge: Cambridge University Press.

Hillier, B. 1996. *Space is the Machine: A Configurational Theory of Architecture*. Cambridge: Cambridge University Press.

Hillier, B. 1999. 'The Hidden Geometry of Deformed Grids: Or, Why Space Syntax Works, When it Looks as though it Shouldn't'. *Environment and Planning B: Planning and Design* 26: 169–91.

Hillier, B. 2005. 'Between Social Physics and Phenomenology: Explorations Towards an Urban Synthesis?'. In *Proceedings of the 5th International Space Syntax Symposium*, edited by A. van Nes. Delft: TU Delft: 3–23.

Hillier, B. and J. Hanson. 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.

Letesson, Q. 2009. *Du phénotype au génotype: Analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2013. 'Minoan Halls: A Syntactical Genealogy'. *American Journal of Archaeology* 117.3: 303–51.

Norberg-Schulz, C. 1980. *Genius Loci, Towards a Phenomenology of Architecture*. New York: Academy Editions.

Palyvou, C. 1986. 'Notes on the Town Plan of Late Cycladic Akrotiri, Thera'. *Annual of the British School at Athens* 81: 179–94.

Palyvou, C. 1990. 'Architectural Design at Late Cycladic Akrotiri'. In *Thera and the Aegean World III*, vol. 1, edited by D. Hardy, C. Doumas, J. Sakellarakis, and P. Warren. London: Thera Foundation: 44–56.

Palyvou, C. 2002. 'Central Courts: The Supremacy of the Void'. In *Monuments of Minos. Rethinking the Minoan Palaces* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 167–77.

Palyvou, C. 2009. '*Πρόπυλα της Εποχής του Χαλκού στο Αιγαίο*'. In *ΔΩΡΟΝ, Τιμητικός Τόμος για τον καθηγητή Σπύρο Ιακωβίδη,*, edited by D. Daneilidou. Athens: *Ακαδημία Αθηνών*: 537–63.

Peponis, J. 2012. 'Building Layouts as Cognitive Data: Purview and Purview Interface'. *Cognitive Critique* 6: 11–51.

Preziosi, D. A. 1983. *Minoan Architectural Design: Formation and Significance*. Berlin: Mouton.

Rapoport, A. 1969. *House Form and Culture*. Englewood Cliffs, NJ: Prentice-Hall.

Read, S. and J. Gil. 2013. 'Central Places and Modality Environments: An Historical Architecture of Urban Places'. In *Proceedings of the Ninth International Space Syntax Symposium*, edited by Y. Kim, H. Park, and K. Seo. Seoul: Sejong University: 051:1–051:14.

Rowe, G. P. 1982. 'A Priori Knowledge and Heuristic Reasoning in Architectural Design'. *Journal of Architectural Education* 36.1: 18–23.

Scranton, R. 1949. 'Group Design in Greek Architecture'. *Art Bulletin* 31.4: 247–68.

Seamon, D. 1994. 'The Life of the Place: A Phenomenological Commentary on Bill Hillier's Theory of Space Syntax'. *Nordic Journal of Architectural Research* 7.1: 35–48.

Seamon, D. 2013. 'Environmental Embodiment, Merleau-Ponty, and Bill Hillier's Theory of Space Syntax: Toward a Phenomenology of People-in-Place'. In *Rethinking Aesthetics: The Role of Body in Design*, edited by R. Bhatt. New York: Routledge: 204–13.

van Effenterre, H. 1987. 'The Function of Monumentality in the Minoan Palaces'. In *The Function of the Minoan Palaces: Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska institutet i Athen: 85–7.

Woolley, C. L. 1931. 'Excavations at Ur, 1930–1'. *Antiquaries Journal* 11.4: 343–81.

Yiannouli, E. 1992. 'Reason in Architecture: the Component of Space'. PhD thesis. University of Cambridge.

9

Community Building/Building Community at Gournia

D. Matthew Buell and John C. McEnroe

9.1. INTRODUCTION

For more than a century Gournia has been one of the key sites for understanding Minoan urbanism. Excavations by Harriet Boyd Hawes (1901–4), Jeffrey Soles and Costis Davaras (1971, 1972, and 1979), an intensive archaeology survey by Costis Davaras and L. Vance Watrous (1992–4), cleaning operations by Watrous near the shore (2008 and 2009), and the current Gournia Excavation Project (hereafter GEP) also directed by Watrous (2010–present) have resulted in one of the most extensively explored Bronze Age towns in the Eastern Mediterranean (Hall 1912; Boyd Hawes et al. 1908; Watrous et al. 2012; Watrous et al. 2015). By the end of the Neopalatial period the excavated section of the town covered some 1.68 ha, consisting of a number of interdependent components, including approximately sixty-four houses, a small palace, harbour facilities, a 500 m^2 *plateia*, and a cobblestone street system with a total length of more than half a kilometre (Gomrée 2013: 850).

When we began our work with the GEP we assumed that we would simply add the new excavations to the existing plan by Boyd. However, we quickly discovered it was not possible to make the old plan fit with our new survey points. Moreover as we looked more closely at the old plan we discovered a number of other problems. We noticed that walls, rooms, and even entire buildings had been omitted. In addition, the straight lines of the earlier plan had the effect of regularizing the architecture and masked the chronological complexity of the site. We decided, therefore, to make a new GIS-based plan of the entire site (Fig. 9.1). When combined with excavation data, our new architectural analysis provides a rich dataset, which is useful for both inter-island and cross-cultural comparisons of urban development and change. This dataset also provides us with the opportunity to examine how the various

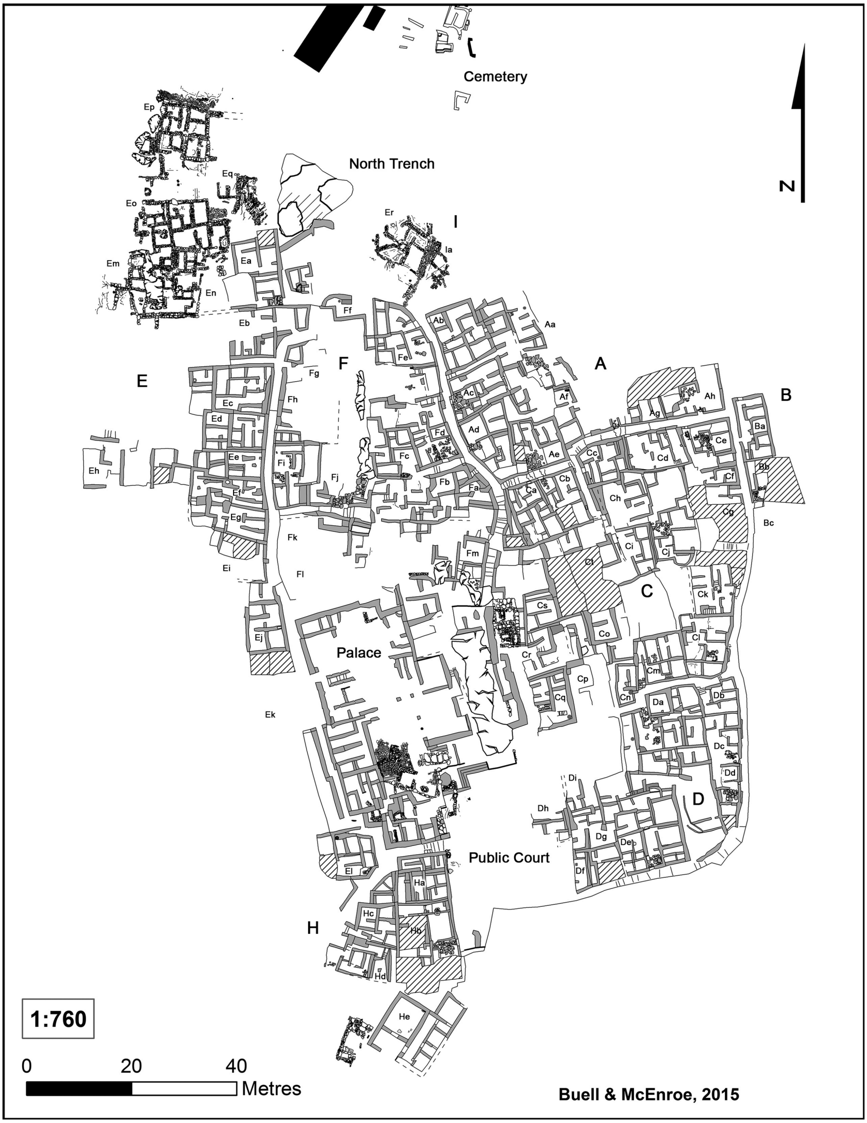

Fig. 9.1. New map of the settlement at Gournia. Buildings excavated by the Gournia Excavation Project in black (plan by the authors).

components of the town interacted from the time of its foundation in the Early Minoan period through to its final use in the Late Minoan III period. By examining the diachronic development of Gournia through a multi-scalar lens, we provide a deeper understanding of the development of the town as both an architectural and a social community, one which was shaped by the interactions of its constituents over time (Yaeger and Canuto 2010: 5–6).[1]

9.2. THE NEOLITHIC PERIOD

There is little evidence for any substantial Neolithic occupation of the Gournia area. In 1910, Richard Seager excavated a Final Neolithic deposit, perhaps once belonging to a habitation, in a small cave (Rock Shelter I) on the south slope of the coastal ridge at Pera Alatzomouri (hereafter Sphoungaras), 150–200 metres north of the Gournia ridge (Hall 1912: 46–8) (Fig. 9.2). GEP's work on the Gournia ridge has only identified chance sherds, suggesting that the area was used infrequently during the Neolithic period.

9.3. THE PREPALATIAL PERIOD

9.3.1. The Cemetery

The Gournia ridge was first settled permanently in the Prepalatial period. At this time, Early Minoan II–III burials appeared in rock shelters along the Sphoungaras ridge (Fig. 9.2). Direct inhumations in the ground occur in two other areas on the ridge, Deposits A and B (Hall 1912: 48–56). The area continued to be used for pithos burials through the Middle Minoan period (Hall 1912: 58–72).

A second cemetery on the northern spur of the Gournia ridge included burials in rock shelters (V and VI) and one built tomb, House Tomb III (Boyd Hawes et al. 1908: 56; Soles 1992: 2) (Fig. 9.1). House Tomb III continued into the Middle Minoan IA period at which point five additional House Tombs (I, II, IV, VII, and VIII) were constructed. Recent excavations in this area confirm that these were the only tombs constructed here. The contents of Gournia's House Tombs included numerous prestige objects, such as gold and silver beads, a silver kantharos, copper-alloy implements and tools, ivory plaques, stone vases, and sealstones, indicating that these were the tombs of the local elite (Soles 1992: 9–17, 23–8, 31–4).

9.3.2. Settlement

The GEP and earlier researchers have identified a few Prepalatial deposits on the Gournia ridge beneath later houses (Soles 1979). In addition, vast quantities of Prepalatial material were recovered from several large dumps, the most notable of which is the North Trench deposit. It now seems, however, that these dumps were deposited in the succeeding Middle Minoan IB period (Watrous et al. 2015: 420).

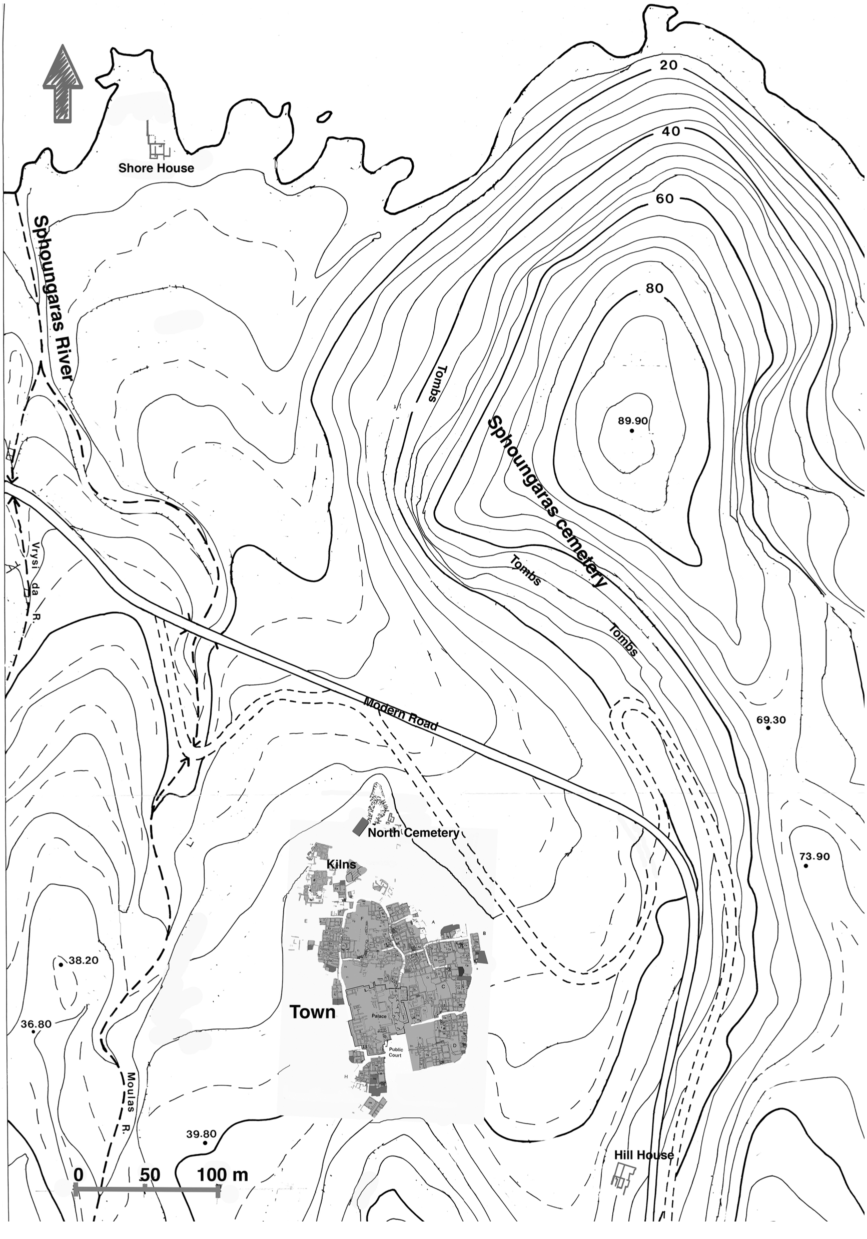

Fig. 9.2. Gournia and environs (adapted by authors from Watrous 2012: fig. 1, with permission).

Besides the House Tombs, the only possible Prepalatial structure uncovered by the GEP is in the area of rooms 20 and 20a in the later palace. Here, a lambda-shaped stone platform was discovered immediately beneath the early Protopalatial boulder fill discussed below. This platform was founded on bedrock and all associated ceramic remains dated to Early Minoan II and Middle Minoan IA.[2]

9.3.3. Overview of the Prepalatial Settlement

Despite the relative lack of *in situ* Prepalatial finds at Gournia, we tentatively suggest that the settlement was divided into three distinct, spatially separate districts: 1) the cemetery at Sphoungaras, 2) the cemetery on the northern spur of the Gournia ridge, and 3) the settlement itself. The different burial types and mortuary assemblages indicate disparities in the socio-economic standing of some groups. The House Tombs suggest that at least six elite groups were living at Gournia in the Prepalatial period.

9.4. THE PROTOPALATIAL TOWN

Although there were hints from Boyd's excavations of a significant Protopalatial occupation on the Gournia ridge, the actual evidence for this was quite limited. Sporadic burials continued both in the Sphoungaras cemetery and in the House Tombs of the North Cemetery (Soles 1992: 1–2). Boyd also excavated Protopalatial deposits underneath later houses Ff and El, Deposit A on the eastern slope, and one area south of the later 'Public Court' (Soles 1979: 151–2). Moreover, she concluded that houses Aa, Ek, and a house beneath Neopalatial house Ca were constructed in the Protopalatial period. Watrous's recent survey of the Gournia area confirmed that the Protopalatial period was a time of major growth and change (Watrous and Schultz 2012: 44). The settlement extended from the acropolis on the south to the coast on the north, and from the Sphoungaras ridge on the east to the adjoining hill on the west bank of the Sphoungaras River (Watrous 2012: 523–9, 535–6, table 1; Watrous and Schultz 2012: 45) (Fig. 9.2). Recent excavations have dramatically improved our understanding of the Protopalatial town.

9.4.1. The Northern Area

In the northern area of the site the GEP confirmed that Wall X-X, a large (1–1.3 metres wide) retaining wall constructed of large stones of white crystalline limestone rubble, was constructed in the Middle Minoan IB period. The massive pottery dump in the North Trench was also deposited during this period, not in the Early Minoan III period, as was previously thought (Hall 1912). Indeed, the North Trench deposit may have been the result of extensive clearing operations in advance of Middle Minoan IB constructions elsewhere in the settlement.

On the slope east of Wall X-X, the GEP revealed a small complex (Building Er, rooms 130–5) that may have been constructed to manage run-off water from the slope to the south. This facility consists of three large connected basins (spaces 130–2), a number of channels cut into the bedrock, an open court (133), and several terrace walls. A section of a north–south paved street ran underneath the later Neopalatial North Ridge Road. On the opposite side of the street stood another building of indeterminate function (Building Ia, rooms 1–2). Buildings Er and Ia were constructed in the Middle Minoan IB period and they went out of use sometime in the same period. Middle Minoan IB materials were dumped over both structures perhaps in the same operation that created the North Trench deposit.[3]

The GEP also uncovered several Protopalatial structures to the west of Wall X-X (Fig. 9.1). One of these, the so-called Pit House (Building Ep, rooms 120–4), was a free-standing building, consisting in its Middle Minoan II phase of four communicating rooms (the wall that defines room 122 was constructed in the Late Minoan IB period). The north wall of Building Ep, which forms the building's external facade, was constructed of the same monumental white crystalline limestone as Wall X-X to the east. We use the term *monumental rubble* to denote a wall fabric wherein the stones used are bigger than 70 cm in one dimension, usually length. We have replaced Boyd and Zielinki's definition of walls possessing such stones as 'Cyclopean', since this term is somewhat misleading, given the use of the same designation for a different type of wall fabric that appears at some Mainland Bronze Age sites (Boyd Hawes et al. 1908: 19; Zielinski 1998: 53–4). Quite simply, we use the term monumental to signify that the stones employed go beyond any purely utilitarian or practical functions (cf. Trigger 1990: 119). Excavations have confirmed that the area north of the Building Ep was uninhabited and that this monumental facade would have been visible for some distance to the north, since Building Ep was accessed in the Protopalatial period via an east–west street similar in construction to that running between Buildings Er and Ia.

To the south of Building Ep at least two buildings (Building Eo, rooms 98–101 and Building En, rooms 88–97) were constructed in the Protopalatial period, probably in Middle Minoan II. The GEP found some evidence for ceramic production in the earliest phase of Building Eo, although the scale of these endeavours is, at present, little understood. All buildings in the north-western area were abandoned at the end of the Protopalatial period.

9.4.2. The Area of the Palace

In the Middle Minoan IB period builders undertook a large-scale levelling operation in the area of Rooms 18 and 20 of the later palace. First they laid down a layer of irregular rubble, and soon afterwards covered it with a layer of small water-worn pebbles. A north-east–south-west running retaining wall was constructed to contain the south edge of the levelling fill, and Room A, a freestanding square structure with low ledges lining its walls, was then built up against this retaining wall.

Room A was used only for a brief period of time before being backfilled and abandoned. Although we do not understand the purpose of this enigmatic little structure at present, it does provide us with some useful chronological information: no monumental building was constructed in this part of the later palace site until after Room A was abandoned in Middle Minoan IB. Moreover, evidence from five trenches laid out in various areas of the settlement's main *plateia* suggests that it also was not used at this point in time. Room A, therefore, may have marked the southern limit of the Middle Minoan IB town.

9.4.3. The Earliest Monumental Architecture at Gournia

The monumental rubble walls in Building Ep and Wall X-X marked a significant change in social complexity. As the earliest form of monumental architecture at the site, they served as a symbolic manifestation of the power of the sponsoring groups, and a demonstration of their ability to marshal the people and material resources necessary for their construction. Monumental rubble facades, visible from the streets and from the surrounding countryside, made the social hierarchy within the town visible (Buell 2014a: 62–3; Zielinski 1998: 10–11, 101–77, 385). Boyd thought that all the monumental masonry at Gournia dated to the second half of the Town Period (i.e. Late Minoan IA–Late Minoan IB) when, she wrote, 'there was increased mechanical skill among the people, or some social change, that placed the labour of the many at the bidding of a few' (Boyd Hawes et al. 1908: 21). Boyd's dating for this type of masonry fabric has been accepted by Soles, Zielinski, and most other writers (Soles 1991; Zielinski 1998).

We are now able to identify two distinct styles of monumental rubble masonry at the site. These two styles are distinguished from one another in three ways: the kind of stone used, the sources of the stone, and the building techniques employed. Protopalatial monumental rubble masonry consists of large (> 70 cm in any direction, usually length) irregular blocks of white crystalline limestone. Too brittle to hammer-dress, the large stones were irregularly placed and the spaces between them were filled with smaller stone wedges. The stone is the same white crystalline limestone that forms the bedrock spine that runs through the entire length of the town. Some of the building stones may well have come from within the settlement, but most were probably brought from the small promontory to the south of the settlement where the bedrock strata have naturally split into rough blocks of the appropriate size. The materials, techniques, and sources used in the construction of these walls represent a set of choices among alternatives (Rapoport 1990: 45, 80, 83). The monumental scale outweighed any utilitarian purpose: these walls were intended to communicate messages related to status and power (Trigger 1990: 119, 124–5, 128; see also Buell 2014b: 268–9; Fisher 2009: 184).[4]

Walls constructed with the white crystalline monumental rubble are dispersed throughout much of the site. Besides Wall X-X, the north facade of Building Ep (see section 9.4.1), this type of masonry can be found in blocks C (Cq), D (De), E (Eb, Ec, Ee, Ef, Eg), F (Fc, Fh, Fj, Fb) (Fig. 9.3). These wall fragments are the last vestiges of the Middle Minoan IB–II monumental houses. The north end of the Shore House in the harbour area was also built of white crystalline monumental rubble.

The most extensive sections of white crystalline monumental rubble masonry are at the top of the Gournia acropolis, forming the north and east facades of the palace. Boyd dated these massive walls to the Late Town period (Late Minoan IA–Late Minoan IB). She specifically remarked that the east wall of the palace reminded her of the double Town Wall at contemporary Phylakopi III in Melos (Boyd Hawes et al. 1908: 21). In his careful re-examination of the palace, Soles agreed that most, if not all, of the eastern section of the palace was a later addition, built for defensive reasons to enclose the summit of the acropolis. He pointed out that the ‘Great Tower’ (Room 35) interrupted the course of the East Ridge Road and cut off access to the north-east corner of the palace. Therefore, the Great Tower, in his opinion, had to post-date the use of the street (Soles 1991: 29–30, 67).

We see the situation differently. Excavation by the GEP within the tower reveals that it was in use in the Late Minoan IA period, providing a *terminus ante quem* for the white crystalline monumental rubble masonry that it was built against. Below the Neopalatial floor of the Great Tower, the GEP identified a small Protopalatial room that had been destroyed by the construction of the tower. In addition, in the area immediately south of the Great Tower, the GEP uncovered a large Middle Minoan III deposit that immediately preceded the tower’s construction. The Neopalatial street that Soles thought had to predate the construction of the tower seems to have been constructed in Late Minoan IB after the Great Tower had gone out of use. In the Protopalatial period, the southward continuation of the East Ridge Road was further to the east on the lower terrace. The early street ran along the east facade of the palace until it eventually joined East Ascent C.

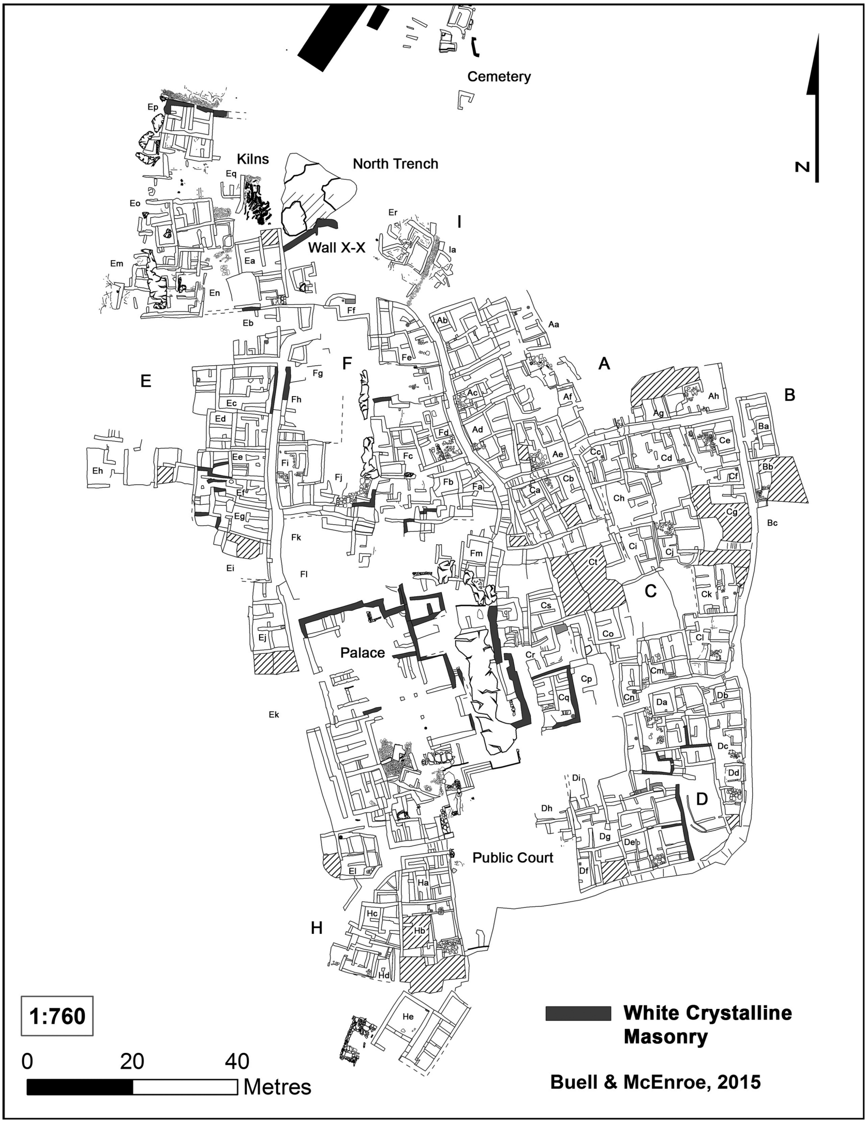

Fig. 9.3. Distribution of Protopalatial white crystalline monumental masonry fabric (plan by the authors).

The craggy white crystalline monumental rubble walls that form the east, north, and north-west facades of the palace represent a unified structure that was eventually incorporated into the later palace. These walls are the remains of a Protopalatial palace. The earlier palace would have looked remarkably different from the later building. It was perhaps roughly square, and did not extend as far south as its successor. It straddled the summit of the highest part of the town acropolis like a fortress, its rugged white masonry visible from a considerable distance. When these massive facades were incorporated into the expanded later palace, their appearance of aggressive strength was lessened.

9.4.4. The Protopalatial Street System

Like monumental architecture whose scale and elaboration exceeds structural necessity, community or 'public amenities', such as extensive street systems, exceed the needs of the individual houses in order to provide for the needs of the larger social group (Cowgill 2004). In his recent dissertation on Minoan street systems, Gomrée (2013) describes the variety of roles that streets play within the larger urban fabric. They were not only for communication within the town and to provide access to the houses, but also provided light, air, and drainage. Perhaps most importantly, they served as vital areas for social interaction (Gomrée 2013: 898–930). Gomrée (2013: 918–26) also discusses what he calls 'the chicken-or-the-egg' problem in Minoan urban development: which came first, the town buildings or the street system?

Boyd Hawes et al. (1908: 21–4) saw the development of the Neopalatial buildings and streets as a continuing, organic process of interdependent components. Some houses (Ag, Ce, Cn, Eb, El, Hd, etc.) belonged to a relatively early stage of the Neopalatial period, while other areas (e.g. Block D) were abandoned before the rest of the town (Boyd Hawes et al. 1908: 21–4). Boyd thought that the construction of the streets was similarly gradual. Later writers, however, have interpreted the situation differently. In 1972, Branigan proposed that most of the streets of Neopalatial Gournia had been laid out originally in the Protopalatial period before the Neopalatial town grew up. This pre-existing framework of the streets divided the town into six 'insulae' (Branigan 1972: 752). Like Branigan, Soles (1979: 155–6, 164; 1991: 6) thought that most of the Neopalatial street system followed the lines of an earlier Protopalatial street system. Soles concluded that the earlier town resembled the later town, except that the earlier town lacked a palace and large *plateia*. Soles's view became the default interpretation of the site (Buell 2014a: 57; Driessen 2010: 36; Driessen and Macdonald 1997: 213; Gomrée 2013: 649–50; McEnroe 1979: 111–12; 2010: 60; Zielinski 1998: 399, 406, 532).

To date, no one has offered a clear explanation as to how or why the Protopalatial streets came to be constructed in a period that was thought to have preceded the construction of the first palace. Who, for instance, would have organized the building programme, recruited the labour, organized the construction, and provided for the upkeep of such an extensive network of streets? An elaborately paved street system as extensive as the one at Gournia presupposes the involvement of some organizing authority (Buell 2014a: 60). GEP's work has done much to resolve the 'chicken-and-egg' quandary.

Excavations in the area of the Buildings Ep, Er, and Ia have shown that there were two phases of the street system at Gournia, an earlier one dating to the Protopalatial period, and a later Neopalatial network. The two phases were distinguished by materials and techniques, and the dates are confirmed by the ceramic evidence from the excavation. Although the later street system sometimes followed the lines of the Protopalatial system, this was not always the case.

In the Northern Area of the site, a section of street pavement, approximately 12 m long, runs along the north side of Building Ep. The second stretch of Protopalatial pavement runs approximately north–south for about 16 m through the North-eastern area between Buildings Er and Ia. Neither of these streets was resurfaced in the Neopalatial period. In fact, the early street between Buildings Er and Ia actually runs underneath the later Neopalatial North Ridge Road. In both sections, the street pavement is made of water-worn tripolitza limestone cobbles, carefully selected for their intense blue-grey colour. The cobbles vary in size, and appear to have been placed randomly. As we shall see in section 9.5.3, this method of paving differs from the centreline method of paving used from Middle Minoan III on.

9.4.5. Overview of the Protopalatial Town

The Protopalatial town of Gournia consisted of five districts, each characterized by a distinct social identity and a homogeneous architectural form.[5] These are: 1) the coastal area; 2) the Sphoungaras cemetery (limited use); 3) the house tomb cemetery on the northern spur of the settlement; 4) the residential area of the town; and 5) the new palatial civic-ceremonial centre.

The Protopalatial period did not involve a total break with the past. For example, elite families continued to use the House Tombs in the north cemetery, perhaps in order to claim continuity with the past. In other respects, however, the town at Gournia was startlingly different. In architecture and in social organization, Gournia had become vastly more complex.

Within the residential area of the town we see three of the most important innovations in the history of Gournia: the construction of the first palace, the construction of the first monumental mansions, and the establishment of the first large-scale community amenities in the form of a network of paved streets. It was not accidental that these three elemental components came into being at the same time. They were inextricably linked just as the three social groups they represent (the emerging palatial authorities, the elite residents of the monumental houses, and the rest of the community) were interdependent. None of this should be particularly surprising. The social and architectural transformations at Gournia parallel the broadly contemporary transformations at Malia, Knossos, and Phaistos (Schoep 2010).

9.5. THE MIDDLE MINOAN III–LATE MINOAN IA PERIOD

9.5.1. The Pithos Cemetery at Sphoungaras

There was a major change in burial practices in the Middle Minoan III–Late Minoan IA period. After serving for generations of elite burials, the House Tombs in the North Cemetery went out of use. The slopes of Sphoungaras, which had been used intermittently in the Protopalatial period, now became the major cemetery, and individual burials in pithoi—more than 150 dating to this period—replaced the communal ossuaries of the House Tombs (Hall 1912).

Boyd (Boyd Hawes et al. 1908: 19) dated the majority of the extant structures at Gournia, including most of the houses and the streets, to what she considered to be the 'best period' of Gournia, her Town Period (Late Minoan IA–IB). In rare instances, Boyd made reference to structures dating specifically to the later part of the Town Period (Late Minoan IB). The most important of these later Town Period constructions was the ashlar facade of the palace.

Boyd noted that there seemed to be differences in masonry materials and techniques between periods. She commented, for instance, that the walls of earlier, Middle Minoan structures, like house Aa, were constructed from smaller, unmodified stones set in heavy clay mortar while those of the Town Period made use of large stones, less mortar, and wedge stones (Boyd Hawes et al. 1908: 21). In addition, Boyd suggested that the walls constructed from a fabric of large 'Cyclopean' stones belonged to the latter half of the Town Period (Late Minoan IB). Boyd was less clear about the chronology between these two extremes. With the exception of House El, Boyd's monograph does not describe any artefacts, fixed or portable, as dating specifically to the Middle Minoan III period.[6] In subsequent reassessments of Boyd's finds, scholars have identified a few late Middle Minoan III deposits in Block D, but prior to the GEP's work at the site, Middle Minoan III was essentially a lacuna in the history of the town (Driessen and Macdonald 1997: 211; Warren 1991: 337). Unfortunately, the Middle Minoan III gap exists for many other sites as well. Hopefully, reassessments of site assemblages and publications like *Intermezzo* will continue to shed light on this important, formative period (Macdonald and Knappett 2013).

9.5.2. The New Palace and the Plateia

The GEP's recent work in this area demonstrates that Middle Minoan III was a remarkably active period. The majority of information comes from the southwestern end of the palace (rooms 13–17). Two significant deposits have been recovered in Room 13. On stylistic grounds, the lower or earlier deposit has been dated to the Middle Minoan IIIA period. This deposit consisted of intact cups, bowls, jars, miniature vessels, scoops, a chalice, an incense burner, and animal bones (sheep/goat, cattle, pig, and fish) (Watrous et al. 2015: 432–3). In total, some 294 vessels were recovered. Three rubble walls to the east, west, and south within this space also date to this period. The northern wall was built in two phases, with the lower dating to the Middle Minoan IIIA period while a later part seems to have belonged to the Late Minoan IB remodelling of the palace when the ashlar facades were installed along the south-western end of the palace. The deposit in Room 13 commemorated a large-scale ritual feast, perhaps connected to the foundation of the Middle Minoan IIIA palace.

The earliest levels of rooms 14, 15, and 16 in the palace all contained Middle Minoan IIIA deposits in their lowest levels. In Room 15, Middle Minoan IIIA remains were associated with a small, rubble north–south wall with plaster floors on either side. The eastern and western walls and lower section of the southern wall of Room 17 can also be dated to this period. In light of the foregoing discussion, it appears as though there was an earlier Middle Minoan IIIA facade running along the southern side of the palace. Most of this wall was either removed or built upon, such as is the case for the southern wall of Room 17, during the Late Minoan IB remodelling of the palace when the ashlar facade was installed. And finally, like Room 13, Room 17 also produced a large Middle Minoan IIIA deposit consisting of cups, bowls, incense burners, miniature vessels, plaster tables, and a portable hearth, perhaps also the remains of a ritualized feast (Watrous et al. 2015: 439; see also Dietler 1996; Wright 2004).

A Middle Minoan III covered drain was identified in the *plateia*, just to the south of the 'sacrificial slab' and east of Room 17. This drain was associated with the construction of the palace itself, since it ran through the palace's facade. Excavations to the north of the facade underneath the large 'sacrificial slab' revealed a floor of stone slabs framed by wooden panels (unpreserved) and faced with plaster strips. Indeed, such a situation is similar to the flooring of the contemporary Minoan Hall at Galatas (Rethemiotakis forthcoming). Adjacent to the palace facade, the GEP identified a Middle Minoan III levelling deposit in the north-west corner of the *plateia*, indicating that the 500m^2 *plateia* was laid out and surfaced at this time. The feasting deposit found in nearby Room 17 may indicate some of the activities conducted in the new *plateia*.

Our recent work has also showed that the palace was modified several times during Late Minoan IA. The Great Tower was added to the north-east corner of the palace in the Late Minoan IA period. Built of water-worn tripolitza and conglomerate boulders, the Great Tower is a good example of the new style of monumental masonry fabric that we shall discuss in section 9.5.4. Similar monumental walls forming the eastern and southern sides of the palace's magazines (i.e. rooms 4–7). We can now date this entire central section of the palace to the Late Minoan IA period.

9.5.3. The New Centreline Street System

Unlike the Protopalatial streets that the GEP identified, the Neopalatial street system was constructed primarily of water-worn grey tripolitza cobbles mixed with cobbles of white limestone and conglomerate. Some of the cobbles were hammer-dressed. These Neopalatial streets were laid out in a fairly precise manner: first a central line of stones was laid and then smaller cobbles were placed from the centreline out to the house walls (Fig. 9.4).[7] This means that the street pavement was made either at the same time, or after most of the house facades were in place. This new centreline pavement technique was used for most of the Ridge Road, for the North–South Valley Road, and for sections of the east–west ascents that were reasonably level.

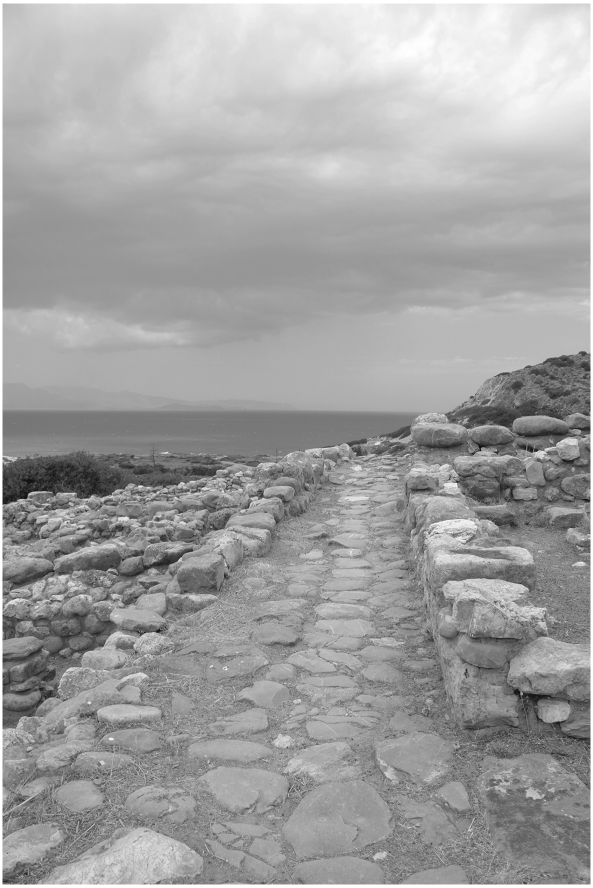

Fig. 9.4. Centreline Street (photograph by Janet Spiller, with permission).

The coherence of the new centreline street system suggests that it was conceived as a single project. On the other hand, that project might have taken some time to complete since it ultimately involved some 1,500 m^2 of pavement (Gomrée 2013: 850). In a few places, some house facades were eventually modified (e.g. D29, F29, and F27), so as to cover sections of the street pavement (Buell 2014a: 60; Chryssoulaki 1990; McEnroe 1979: 239–41; Palyvou 1986: 193). When the house facades were modified they were carefully joined to adjacent facades, forming continuous undulating 'street walls' that framed the space of the streets and masked the divisions between houses. The consistency of the street walls suggests that the communal appearance of the streets was valued over the individuality of the houses. Rather than simple boundaries dividing the site into blocks, or routes connecting the various parts of the town, the streets were perhaps primarily spaces for community interaction (Palyvou 2004). They were sites for talking, working, and playing, places to see people and be seen. At the entrances to most of the houses, the cobbled streets provided access to similarly paved but more private vestibules that served as the liminal space between the realm of the community streets and the more private spaces within the house.

9.5.4. The New Monumental Masonry

In contrast to the monumental masonry of the Protopalatial period, that of the Middle Minoan III–Late Minoan IA period was made from large, water-worn boulders of grey anaphanitic (very fine-grained) limestone streaked with white calcite (Fig. 9.5). Called *sideropetra* (iron stone) locally, the stone is properly called tripolitza. In these walls, the large tripolitza boulders are interspersed with water-worn boulders of conglomerate of roughly the same size. Many of the stones were hammer-dressed. The combination of tripolitza and conglomerate was also used for the Neopalatial street pavements, which likewise show traces of hammer-dressing.

The pavement stones and the monumental boulders may have come from the same source. The water-worn conglomerate boulders are helpful in identifying that source, for while tripolitza boulders are found all along the coast and in the riverbed west of the site, the conglomerate is less common. There is, however, one spot in the Sphoungaras River valley about 200 m north of the town where the surrounding bedrock is conglomerate and appropriately sized water-worn boulders of tripolitza and conglomerate are found together. In sum, this monumental masonry fabric represents a series of three intentional choices: the choice of a different material, the material (water-worn tripolitza and conglomerate boulders); the adoption of a new technique (hammer dressing); and the choice of a new source of materials in the Sphoungaras River.

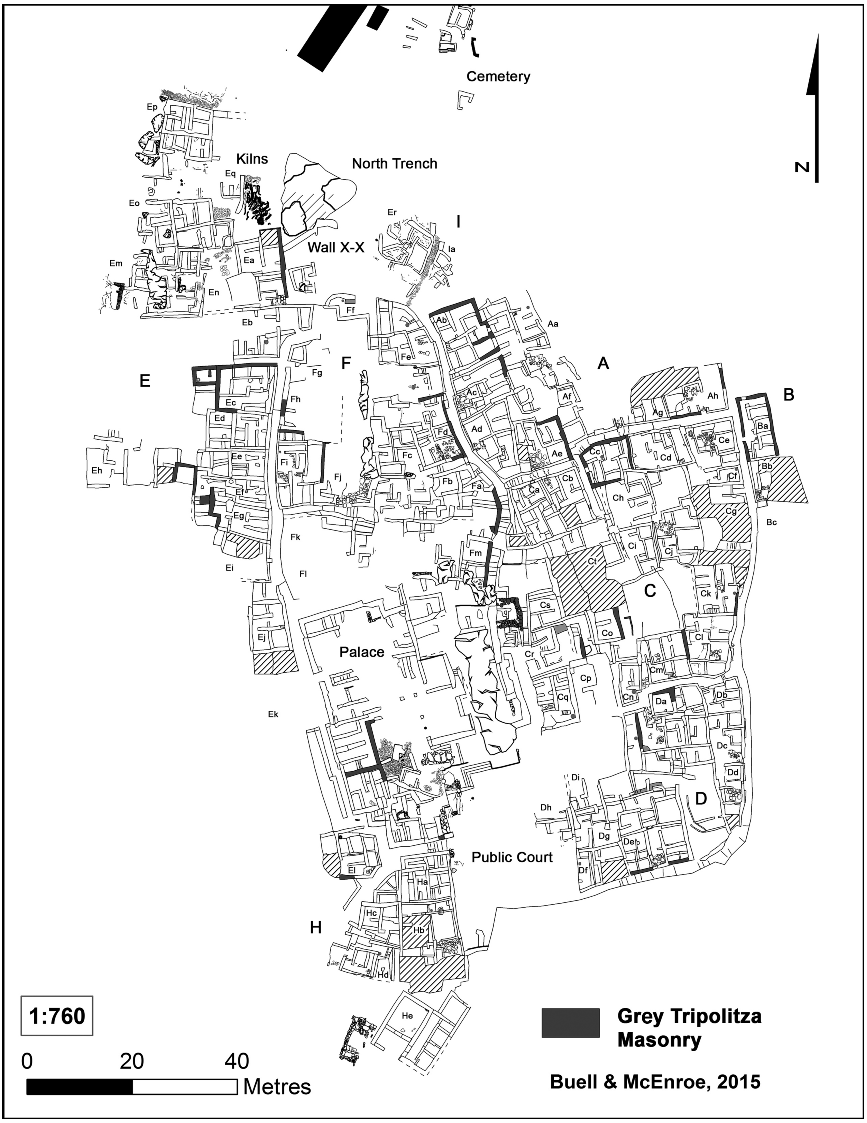

Fig. 9.5. Distribution of Middle Minoan III–Late Minoan IA grey tripolitza monumental masonry fabric (plan by the authors).

Buildings incorporating the new monumental masonry fabric are distributed more or less evenly throughout the town (Fig. 9.5). In addition to the walls in the expanded palace, the major part of one or two houses in each of the blocks being built with this new style of masonry (e.g. Houses Ab, Ac, Ae, Ah, Ba, Cc, Cm, Co, Da, De, Ea, Ec, Ef, Fa, Fd, Fh, Fi, and Fm). Smaller houses fill the spaces between them. The ranked distribution of houses echoes the spread of industrial equipment throughout the town: in this house a woodworking kit, in another textile equipment, in a third house tools for pottery making, etc. (Watrous and Heimroth 2011). Not every house was equipped with the same artefacts, and each to some extent could have depended on the products of other households. The distribution of the grey monumental masonry fabric suggests similar interdependence among households within the each of the blocks of houses, and across the town as a whole.

Zielinski (1998: 545) interpreted the distribution of what he called 'Cyclopean' monumental houses as an embodiment of the social structure of the town. He thought that the street network had been already laid out in the Protopalatial period. During the Neopalatial period the blocks were, to use his word, subdivided with each block having one or two Cyclopean houses and a series of smaller, subsidiary structures. Zielinski suggests that the blocks might have been based on family kinship or clans, and that the unequal social relations within the blocks might have been roughly parallel to the client–patron relations at Pompeii.

Driessen (2010) recently proposed a similar reading of the site. He, too, maintains that the Neopalatial street system had originally been laid out in the early Protopalatial period, and that resulting blocks served family-based social units at a level intermediary between that of the individual house and the town (Driessen 2010: 36–8). Citing the House of Rothschild or Poe's House of Usher as illustrative parallels, Driessen views the 'House' as a multigenerational social institution embodying family memory and social position. Tied in some way to kinship, Houses as social corporations served, in Driessen's (2010) words, as 'major actors' in the history of the community (Buell 2014a: 67–9; see also chapter 5).

Our current understanding of the Neopalatial town at Gournia differs from those of Zielinski and Driessen primarily in some details and in matters of emphasis. We do not think that the town blocks were built as fixed units within a pre-existing street grid. Each block saw continuing, ongoing construction, and its final form was fixed only at the moment of its Late Minoan IB destruction (on buildings' life-histories, see Herva 2005; Letesson 2014: 78–80). For example, in Block A, the earliest monumental house to make use of the grey monumental masonry fabric was not House Ab, which appears so prominent today, but Ac. Part of the monumental north facade of Ac was eventually incorporated into the south-east corner of Ab when the new alley was built between the two buildings. Each block at the site has a similarly complex history that will take us more time to unravel.

The Neopalatial palace was also in a continual state of construction from Middle Minoan IIIA through to Late Minoan IB. Similarly, while the main part of the centreline street system was laid out as a single project, it too, was subject to occasional encroachment and continual repair. Rather than seeing the streets as pre-existing boundaries, we choose to emphasize their roles as ligaments tying the community together (Buell 2014a: 58; Gomrée 2013: 905–10). In this view, it is the areas in front of the houses (the 'face-blocks') that were the primary places of social interaction, rather than the blocks themselves (Buell 2014a: 65–8; Smith 2010).

9.5.5. Northern Area in Middle Minoan III–Late Minoan IA

Preliminary study of the GEP results suggests that there was limited Middle Minoan III–Late Minoan IA occupation in the northern area of the settlement. Building Eo (rooms 106–8) was constructed sometime in either the Middle Minoan III or Late Minoan I A period. The metal working installation (Building Em, rooms 80–7) also seems to have been in use in the Late Minoan IA period. This building incorporated an earlier Middle Minoan III (Em, spaces 82, 85) structure into its overall design. And finally, a complex series of superimposed pottery kilns were also constructed and used in the Late Minoan IA period. All other buildings in the northern part of the settlement were abandoned following the Protopalatial era. What had been a part of the residential district of the town in the Protopalatial period now became an industrial fringe between the edge of the town and the abandoned north cemetery in the Middle Minoan III–Late Minoan IA period. Indeed, the spaces in and around buildings Em, Eo, Ep, and the kilns were used as a dumping ground for Late Minoan IA refuse.

9.5.6. Overview of the Middle Minoan III–Late Minoan IA Town

During the Middle Minoan III–Late Minoan IA the town consisted of five districts: 1) the coastal area, 2) the extensive pithos cemetery on Sphoungaras, 3) the civic-ceremonial centre centred on the expanded palace and the new *plateia*, 4) the residential district, and 5) the northern industrial fringe. The shift of the cemetery from the ancient communal House Tombs of the north spur to the individual pithos burials of the Sphoungaras cemetery may indicate that a different group of people now held authority in the town.

The central part of the town underwent the most extensive transformation since the Protopalatial period. In Middle Minoan IIIA the southern section of the palace was built, and along with it, the large *plateia*. The palace was modified and expanded continually over the course of the Middle Minoan III–Late Minoan IA period. A new fabric of monumental grey tripolitza and conglomerate masonry was used for several of these additions. The same monumental wall fabric was used for the new series of monumental houses that grew up through most of the town. At the same time, the new centreline street system was laid out, using materials and techniques similar to those used in the new palace and the monumental houses. This sweeping architectural transformation is strikingly parallel to the architectural revolution that had taken place in the Protopalatial period. Once again the change involved not just one but three of the key architectural components of the town: the construction of what was essentially a new palace, the construction of a new series of monumental houses for the elite families of the town, and the establishment of a new set of community amenities, including the new community *plateia*, and the extensive new centreline street system. As with the Protopalatial construction projects, we think that simultaneous changes to all three of these urban components (the civic-ceremonial centre, the series of new monumental mansions, and the community street and *plateia* system) indicate the political and economic interdependence of the three key social constituencies, the palace authorities, the sub-elite of the mansions, and the community as a whole. In other words, changes at Gournia were not entirely palatially driven from the top down, nor entirely community driven from the bottom up. In our view, hierarchy and heterarchy are not mutually exclusive.

Before moving on to the Late Minoan IB period, it is useful to recall that despite this dramatic flurry of building activity, this was also a period of contraction. The north House Tomb cemetery was abandoned as were all the Protopalatial residences in the northern part of the site. By the Late Minoan IA period the northern area became an industrial district with a metal working facility and series of massive new kilns, while the surrounding periphery was used as a dump for pottery and construction debris.

9.6. THE LATE MINOAN IB PERIOD

9.6.1. The Cemetery

In the Late Minoan IB period the pithos cemetery on Sphoungaras hill was abandoned. To date, we have not identified the town's Late Minoan IB cemetery.

9.6.2. The Palace and the Plateia

The most significant Late Minoan IB change to the palace was the addition of the ashlar masonry on its western and southern facades (Boyd Hawes et al. 1908; Soles 1992: 22–5; see also chapter 4). The ashlar blocks, brought from a quarry in Mochlos, not only changed the appearance of the building but probably also signalled another significant social change.[8] As Zielinski (1998: 158–9) reminds us, unlike the monumental 'Cyclopean masonry' (our monumental grey masonry fabric), that was local or regional in origin, the adoption of ashlar masonry proclaims an association with an island-wide, and even international, elite architectural style. Yet this did not mean a complete break with the past. The massive Late Minoan IB deposit of feasting/drinking remains found in the south-west corner of the palace is associated with the new ashlar renovation. Placed in the tiny Room 13 directly above the conical cup deposit that marked the original Middle Minoan III construction of the south end of the palace, this later ritual deposit showed that the memory of the previous feast was still alive.

9.6.3. The Late Minoan IB Town

The elegance of the new ashlar facade of the palace contrasts with the continued contraction of the rest of the town. No new large-scale public amenities were built to serve the community. Most of the Middle Minoan III–Late Minoan IA street system remained in use even though a long stretch of the cobble pavement along the west facade of the palace was removed to make way for the new ashlar facade.

In the north part of the settlement, Buildings Ep and Eo were renovated and reoccupied, and there was some additional Late Minoan IB construction in the area of Building Em. Despite these Late Minoan IB renovations, the northern fringe area remained largely industrial.

In other parts of the town Watrous and Heimroth (2011: 200–3) estimated that only forty-five of the sixty-six Neopalatial buildings that Boyd had excavated had evidence of occupation in Late Minoan IB. These included the palace and nearly all of the monumental grey mansions, along with several other smaller rubble houses (Watrous and Heimroth 2011: 203, fig. 18.3). Several houses (e.g. Ec, Ce, Cj, and Cl) were rebuilt in a new style. Their remarkably thin interior walls suggest they were one-storey buildings roughly half the size of the traditional two-storey Gournia houses. Paved internal courts gave these small houses an inward focus rather than tying them to the surrounding community.

One other minor feature may also prove to be significant. Late in the Late Minoan IB period a new masonry fabric was introduced. This fabric made extensive use of reused materials, including reused ashlar blocks. Since ashlar had only been introduced to the site earlier in the Late Minoan IB period, these reused blocks signal a rather quick turnaround from innovative, ostentatious palatial display to refuse recycling. This is consistent with the broader picture of Gournia in the Late Minoan IB period. Most of the resources available for building were directed to the renovation of the palace rather than to public amenities or new monumental houses. This suggests a broadening gap between the palace authorities and the surrounding community.

9.7. CONCLUSION

In this chapter, we have outlined the development of Gournia over the course of a millennium. When we joined Watrous's project six years ago, we would not have anticipated many parts of that story. Much of what we thought we knew about Gournia and how it developed over time has been fundamentally altered by this newest round of excavations. Key discoveries include the identification of the Protopalatial palace and its ties to the first monumental houses and the first community street system. We have been able to investigate parallel developments during the Middle Minoan III–Late Minoan IA period in much greater detail. In that later period we again noted the construction and expansion of what was essentially a new palace, the construction of a new series of monumental houses for the elite, and the creation of a new community *plateia* and street system. Once again, all three projects occurred at roughly the same time. Two aspects of these developments particularly strike us. One is the ongoing, dynamic nature of the construction projects. Until the moment of its abandonment after the Late Minoan IB destruction, the town of Gournia underwent continual change. The second fascinating aspect of those construction projects is their interdependent nature involving the three key stakeholders in the community: the palace authorities, the elite residents of the monumental houses, and the broader community. If the complexity of the ongoing architectural changes is any guide, social relations among those groups were also likely to have been in continual flux as, over centuries, these groups interacted in the process of building community.

ACKNOWLEDGEMENTS

The authors would like to thank Quentin Letesson and Carl Knappett for their invitation to speak in Toronto and for their generous hospitality while there. In addition, we acknowledge the contributions and comments of several of our colleagues, including Kevin Glowacki, Brian Kunkel, David Blome, Tristan Barnes, and Dallas Deforest, on this work. And finally, we would like to express our gratitude to Vance Watrous for inviting us to work at Gournia.

NOTES

1. See Knappett 2011 and Whitelaw 2012 for recent studies that employ a multi-scalar approach to understanding Minoan society.
2. Kevin Glowacki, personal communication.
3. Brian Kunkel, personal communication.

4. Monumental architecture is a form of indexical communication, given its concern with claims of advancement in wealth and status, as advanced by Blanton (1993).
5. See Smith 2007: 7–8, 27; 2010 for comments regarding the creation, form, planning, and recognition of districts in ancient cities and Buell 2014a, for the application of Smith's criteria to the site of Gournia.
6. It seems more likely that this structure dates earlier than the Middle Minoan III period. Restored to its proper dimensions, the building would have encroached upon an area of the palace that recent excavations have determined is Middle Minoan IIIA in date.
7. We thank Clary Palyvou for bringing this to our attention.
8. See Soles (1982) for his study concerning the sandstone source of Gournia's ashlar masonry.

REFERENCES

Blanton, R. E. 1993. *Houses and Households: A Comparative Study*. New York: Springer-Verlag.

Boyd Hawes, H., B. E. Williams, R. B. Seager, and E. H. Hall. 1908. *Gournia, Vasilike and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete*. Philadelphia, PA: American Exploration Society Free Museum of Science and Art.

Branigan, K. 1972. 'Minoan Settlements in East Crete'. In *Man, Settlement and Urbanism*, edited by P. J. Ucko, R.Tringham, and G. W. Dimbleby. Cambridge: Schenkman Publishing Company, 1972: 751–9.

Buell, D. M. 2014a. 'Districts, Neighborhoods, and the Streets that Bind Them: Urban Planning in Minoan Cities'. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond: Proceedings of a Colloquium in Memory of Frederick E. Winters, Athens, 22–23, June 2012*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 55–82.

Buell, D. M. 2014b. 'The Rise of a Minoan City and the (Re)Structuring of its Hinterlands: A View from Galatas'. In *Making Ancient Cities: Space and Place in Early Urban Societies*, edited by A. T. Creekmore III and K. D. Fisher. Cambridge: Cambridge University Press: 257–91.

Chryssoulaki, S. 1990. 'L'urbanisme minoen. A. Le réseau routier urbain'. In *L'habitat égéen préhistorique. Actes de la table ronde international, Athènes, 23–25 juin 1987*, edited by P. Darcque and R. Treuil. Athens: École française d'Athènes: 271–380.

Cowgill, G. L. 2004. 'Origins and Development of Urbanism: Archaeological Perspectives'. *Annual Review of Anthropology* 33: 525–49.

Dietler, M. 1996. 'Feasts and Commensal Politics in the Political Economy: Food, Power, and Status in Prehistoric Europe'. In *Food and the Status Quest: An Interdisciplinary Perspectives*, edited by P. Wiessner and W. Schiefenhövel. Oxford: Bergahn: 87–125.

Driessen, J. 2010. 'Spirit of Place: Minoan Houses as Major Actors'. In *Political Economies of the Aegean Bronze Age: Papers from the Langford Conference, Florida*

State University Tallahassee, 22–24 February 2007, edited by D. J. Pullen. Oxford: Oxbow Books: 35–65.

Driessen, J. and C. F. Macdonald. 1997. *The Troubled Island: Minoan Crete Before and After the Santorini Eruption* (Aegaeum 17). Liège: Université de Liège.

Fisher, K. 2009. 'Elite Place-Making and Social Interaction in the Late Cypriot Bronze Age'. *Journal of Mediterranean Archaeology* 22.2: 183–209.

Gomrée, T. 2013. 'La Voirie des villes minoennes en Crète orientale et à Cnossos (Minoen Moyen I–Minoen Récent I)'. PhD dissertation, Université Lumiére Lyon 2.

Hall, E. H. 1912. *Excavations in Eastern Crete: Sphoungaras* (University of Pennsylvania. The Museum Anthropological Publications 3.2). Philadelphia, PA: University Museum.

Herva, V.-P. 2005. 'The Life of Buildings: Minoan Building Deposits in an Ecological Perspective'. *Oxford Journal of Archaeology* 24.3: 215–27.

Knappett, C. 2011. *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*. Oxford: Oxford University Press.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments* (Topoi: Berlin Studies of the Ancient World 18), edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Macdonald, C. F. and C. Knappett (eds). 2013. *Intermezzo: Intermediacy and Regeneration in Middle Minoan III Crete*. London: British School at Athens.

McEnroe, J. C. 1979. 'Minoan House and Town Arrangement'. PhD thesis, University of Toronto.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Palyvou, C. 1986. 'Notes on the Town Plan of Late Cycladic Akrotiri, Thera'. *Annual of the British School at Athens* 81: 179–94.

Palyvou, C. 2004. 'Outdoor Space in Minoan Architecture: "Community and Privacy"'. In *Knossos: Palace, City, State: Proceedings of the Conference in Herakleion Organized by the British School at Athens and the 23rd Ephoreia of Prehistoric and Classical Antiquities of Herakleion, in November 2000, for the Centenary of Sir Arthur Evans's Excavations at Knossos* (BSA Studies 12), edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 207–17.

Rapoport, A. 1990. *The Meaning of the Built Environment: A Nonverbal Communication Approach*. 2nd edn. Tucson, AZ: University of Arizona Press.

Rethemiotakis, G. Forthcoming. 'Chapter Eight: The Excavation of the Minoan Palace and Town of Galatas'. In *The Galatas Survey: A History of an Inland Area in Central Crete*, edited by L. V. Watrous. Philadelphia, PA: INSTAP Academic Press.

Schoep, I. 2010. 'Making Elites: Political Economy and Elite Culture(s) in Middle Minoan Crete'. In *Political Economies of the Bronze Age Aegean: Papers from the Langford Conference, Florida State University, Tallahassee, 22–24 February 2007*, edited by D. J. Pullen. Oxford: Oxbow Press: 66–85.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 61.1: 3–47.

Smith, M. E. 2010. 'The Archaeological Study of Neighborhoods and Districts in Ancient Cities'. *Journal of Anthropological Archaeology* 29.2: 137–54.

Soles, J. S. 1979. 'The Early Gournia Town'. *American Journal of Archaeology* 83.2: 149–67.

Soles, J. S. 1982. 'A Bronze Age Quarry in Eastern Crete'. *Journal of Field Archaeology* 10.1: 33–46.

Soles, J. S. 1991. 'The Gournia Palace'. *American Journal of Archaeology* 95.1: 17–78.

Soles, J. S. 1992. *The Prepalatial Cemeteries at Mochlos and Gournia and the House Tombs of Bronze Age Crete* (Hesperia Supplements 24). Princeton, NJ: American School of Classical Studies at Athens.

Trigger, B. 1990. 'Monumental Architecture: A Thermodynamic Explanation of Symbolic Behaviour'. *World Archaeology* 22.2: 119–32.

Warren, P. M. 1991. 'A New Minoan Deposit from Knossos, *c.* 1600 B.C., and its Wider Relations'. *Annual of the British School at Athens* 86: 319–40.

Watrous, L. V. 2012. 'The Harbour Complex of the Minoan Town at Gournia'. *American Journal of Archaeology* 116.3: 521–41.

Watrous, L. V., M. D. Buell, J. C. McEnroe, J. G. Younger, L. A. Turner, B. S. Kunkel, K. Glowacki, S. Gallimore, A. Smith, P. A. Pantou, A. Chapin, and E. Margaritis. 2015. 'Excavations at Gournia, 2010–2012'. *Hesperia* 84.2: 497–65.

Watrous, L. V., D. Haggis, K. Nowicki, N. Vogeikoff-Brogan, and M. Schultz. 2012. *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity*. Philadelphia, PA: INSTAP Academic Press.

Watrous, L. V. and A. Heimroth. 2011. 'Household Industries of Late Minoan IB Gournia and the Socioeconomic Status of the Town'. In *Στέγα: The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 199–217.

Watrous, L. V. and M. Schultz. 2012. 'Middle Minoan IB–II Periods: Growth of Regional Factions and Conflict'. In *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity*, edited by L. V. Watrous, D. Haggis, K. Nowicki, N. Vogeikoff-Brogan, and M. Schultz. Philadelphia, PA: INSTAP Academic Press: 41–50.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxford University Press: 114–76.

Wright, J. C. 2004. 'The Mycenaean Feast: An Introduction'. In *The Mycenaean Feast*, edited by J. C. Wright. Princeton, NJ: American School of Classical Studies: 1–12.

Yaeger, J. and M. A. Canuto. 2010. 'Introducing an Archaeology of Communities'. In *The Archaeology of Communities: A New World Perspective*, edited by M. A. Canuto and J. Yaeger. London: Routledge, 2010: 1–15.

Zielinski, J. P. 1998. 'Cyclopean Architecture in Minoan Bronze Age Crete: A Study in the Social Organization of a Complex Society'. PhD thesis, State University of New York at Buffalo.

10

The Middle Minoan Slipway for Ships at the Kommos Harbour, and Harbour Development in Prehistoric Crete

Joseph W. Shaw

10.1. THE MIDDLE MINOAN PAVED WAY AT KOMMOS

10.1.1. Description

Revealed at Kommos in 1985, in Southern Crete, was a long, narrow strip of slab paving, dating to a Middle Minoan (henceforth MM) period (Figs 10.1, 10.2). It is laid out east–west, and was found below the central courts of superposed MM II Building AA, MM III Building T, and Late Minoan (henceforth LM) III Building P (Fig. 10.3)—thus predating them (Shaw and Shaw 2006).[1] At that time the impression was that the pavement was likely a 'walkway' for processions, like those found, especially in MM palatial west courts, in Crete (Driessen 2009; Shaw 2015: 14–17). The walkways sometimes connected building groups, as in the case of Malia (Fig. 10.4). At the time of its discovery, the one at Kommos appeared like an appropriate part of what was to become a palatial site, marked by the Minoan Elite architectural style (Shaw 2015).

However, now, some years later and after further consideration, this identification must be questioned: while most often MM in origin, walkways can be common at any MM palatial site, but only one such pavement is known at Kommos. Also, walkways occur most often on flat expanses such as the West Courts of palaces. That at Kommos stretches in a straight line towards the water edge, and with a constant slope to and from the water (Fig. 10.5). Such a path might even be more useful for sliding ships to and from the water. But most important, in the case of the example at Kommos, there are shallow gaps, 0.15–0.20 m wide, built into the slab pavement every 2.40 m on centre

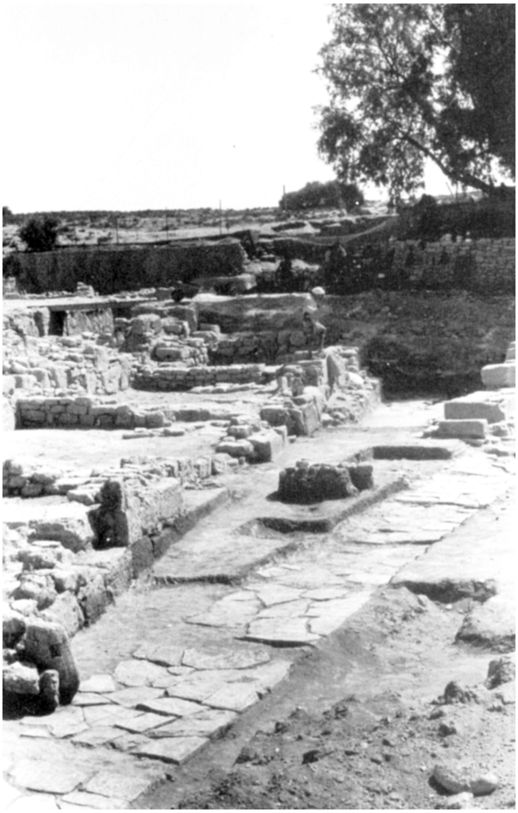

Fig. 10.1. Detail of Middle Minoan paved way south of Archaic Building Q, from south-west (photograph by the author).

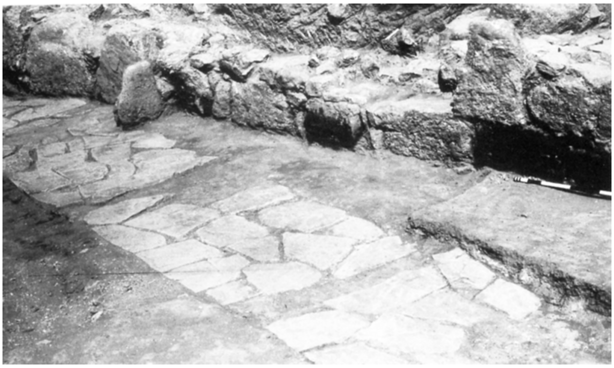

Fig. 10.2. Middle Minoan paved slipway (centre) in central court area, from south-east (photograph by the author).

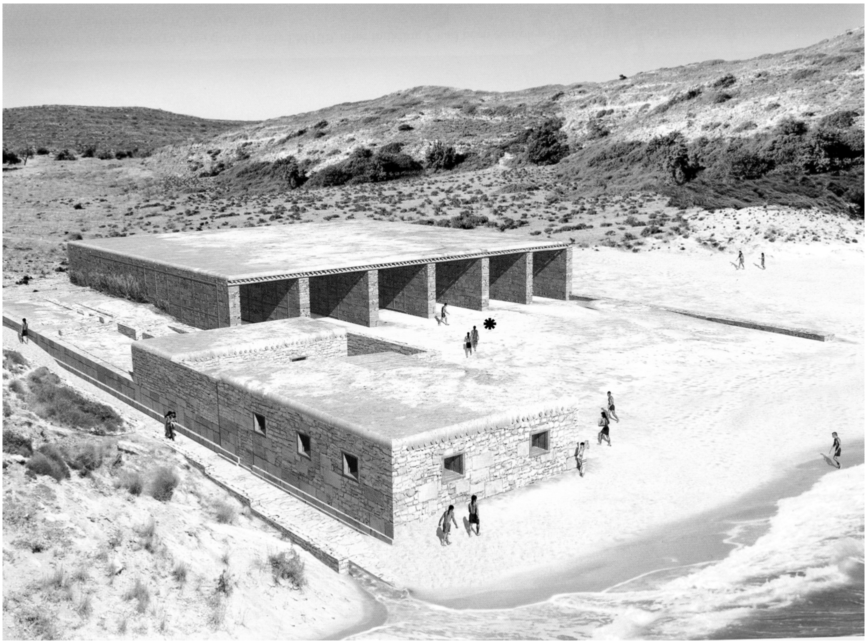

Fig. 10.3. Restorations of Late Minoan IIIB Buildings N (foreground) and P, i.e. the shipsheds, (background) at Kommos, looking south-east (drawing by C. Dietrich, 2003, reproduced in J. W. Shaw and M. Shaw, 2006. *Kommos* V: *The Monumental Minoan Buildings*, Princeton, NJ: Princeton University Press: frontispiece). An asterisk indicates the location of the eastern end of the proposed slipway.

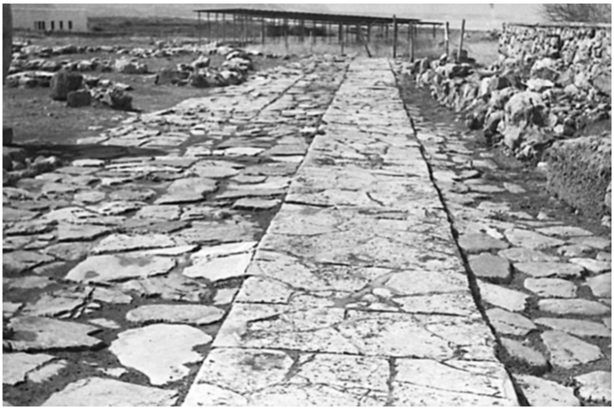

Fig. 10.4. Malia palace walkway, leading west through north-west court toward the Crypte Hypostyle (in background) (photograph by the author; courtesy of INSTAP Academic Press).

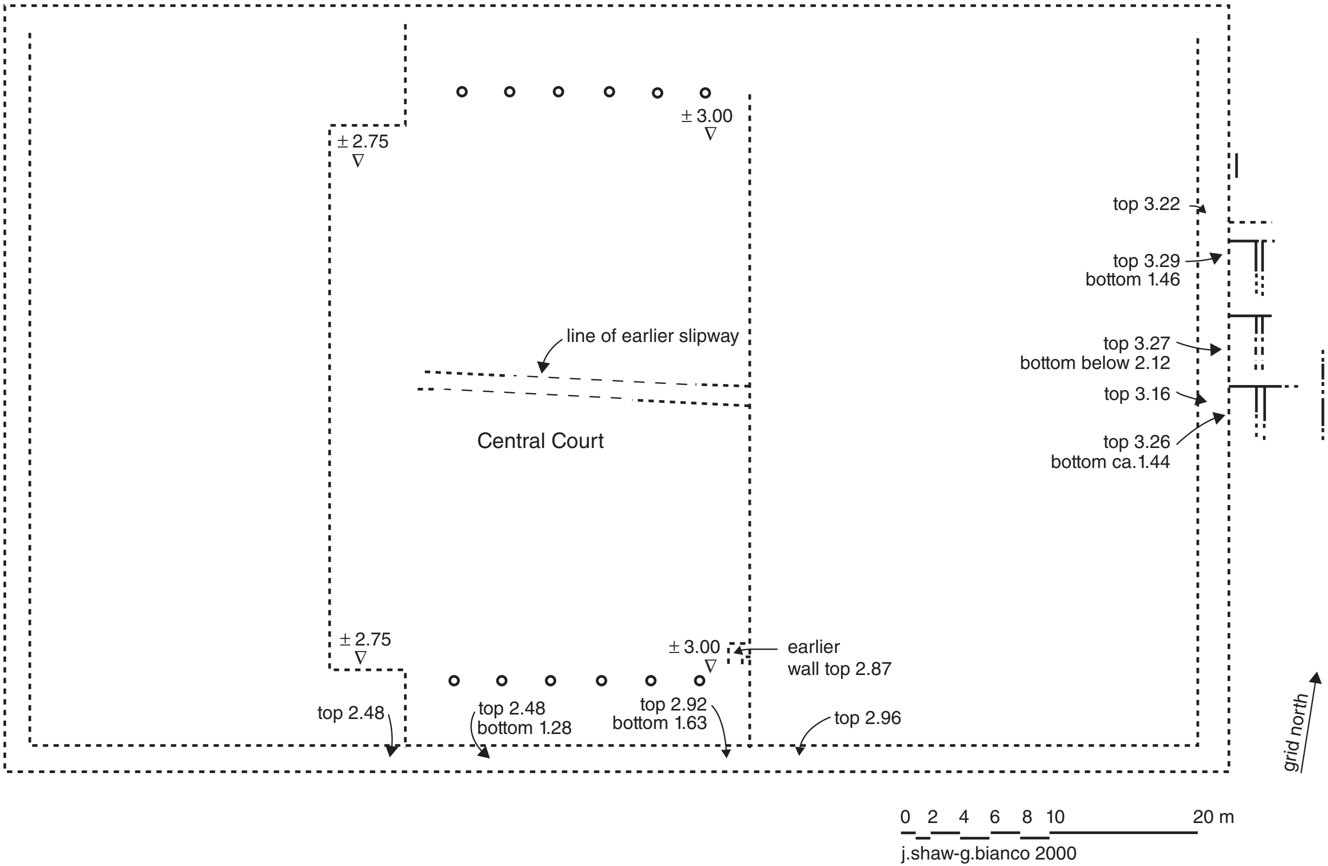

Fig. 10.5. Schematically restored plan of Protopalatial Building AA (plan by the author and G. Bianco).

(Fig. 10.6). Seven such gaps are preserved, labelled 1–7, of which five (2–5, 7) are clearly intentionally aligned. Moreover, outside of Kommos, in Crete, the only walkway with gaps, among the dozens of walkways known, is in the Theatral Area at Phaistos (Fig. 10.7), where the three gaps marked with asterisks are so narrow that they were probably simply drains, if they actually had a purpose.

Further to the immediate context of the pavement (Fig. 10.8), to the east, it begins just west and in front of Gallery 3 of Building P (the shipsheds), then runs down a slight slope (4.67°) some 18.40 m long, where its poorly preserved slabs are partly covered by Archaic Building Q—the latter forming a series of interconnected storerooms (Fig. 10.6). The black sea pebble surfaces of the courts of Buildings T and P were laid directly over the pavement in question, which was set on clay bedrock. Above the pavement, the fill was a mixture of earth and pebbles, along with Minoan and Greek sherds, probably moved around by the rain that had drained down the slope there leading to the sea. It is likely that, originally, the pavement extended further (both eastward and westward) but was destroyed by the building of T and P to the east and by the sea waves on the west. We cannot estimate its original length to the west, although it could have run more than sixty metres to the point where we think the ancient waterline was during the Minoan period. Set upon the court's surface was a late hearth (at b on Fig. 10.6), perhaps Hellenistic, marked by burning.

At two points along the pavement's northern border (at a on Fig. 10.6) was a small amount of white plaster (0.07 m high), one fragment backed on the north by a few small slabs set in line alongside it, as if a small, light structure might once have been there.[2] The date and architectural associations of the pavement remain fairly clear. For instance, just south of it, toward the east, was found a portion of a floor, possibly of MM IB or earlier date (pottery fill was uniformly MM IB in Trench 65A5/81, at +2.59m). On the east, the pavement would have been about 0.10 m below MM II AA's court and, because of the pavement's slope, 0.70 m below the same court's westward extension. The pavement is, also, at an angle to all nearby buildings, suggesting the independence of its construction.

Concerning the pavement's use, we can first imagine that it began close to where the winter waves now break, and continued as much as 50 m inland. The regular, north–south, gaps and the width (*c.* 1.40 m) of the pavement are its most unusual characteristics. Were they drains? If so, why are there so many, and why don't they continue further south? Indeed, it seems more likely that round, or planed, timbers were set into the gaps; with their tops projecting up 5–10 cm. Could the entire pavement have then served as a slipway?

10.1.2. Ancient Harbour Sites of the Eastern Mediterranean: A Brief Comparative Perspective

Up to this point, few prehistoric Eastern Mediterranean harbour sites (such as that at Kommos) have been thoroughly investigated. This is, partly, due to a

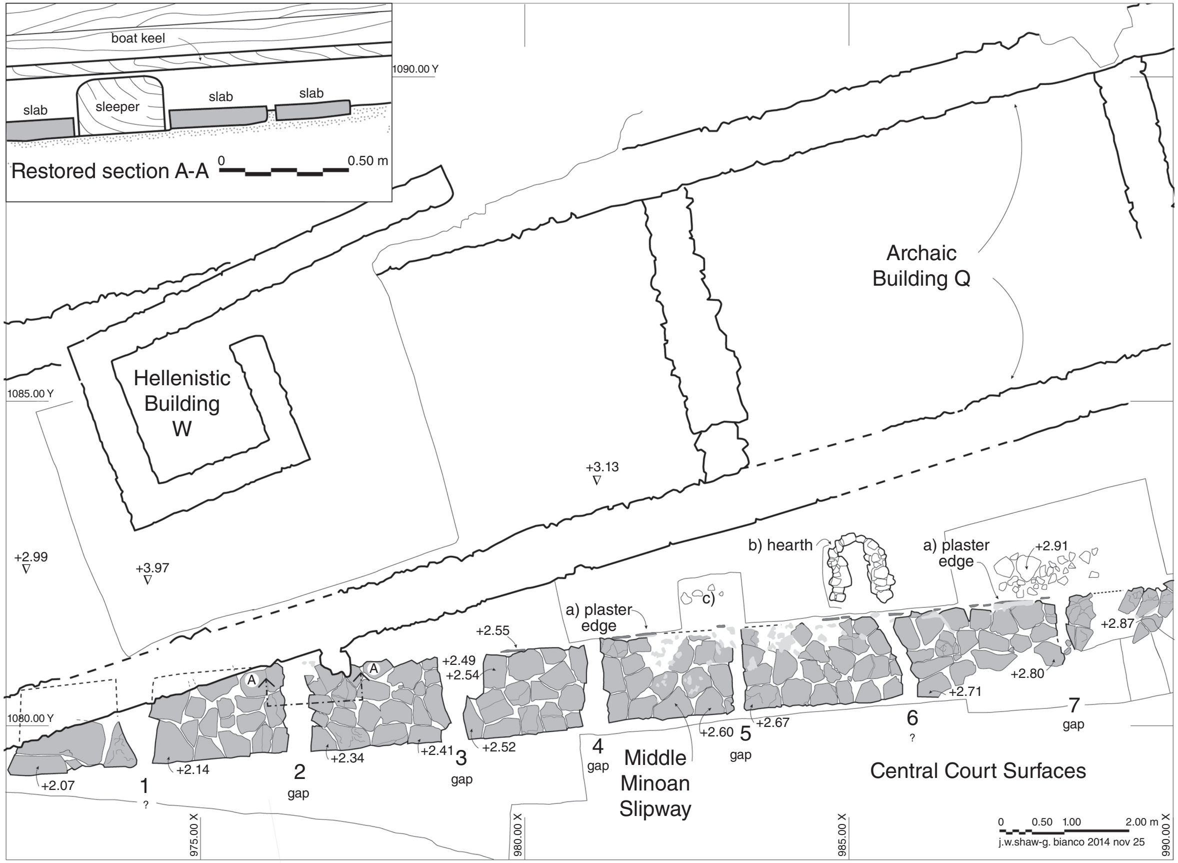

Fig. 10.6. Plan of east–west slipway (plan by G. Bianco, revised from Shaw and Shaw 2000, fold-out E).

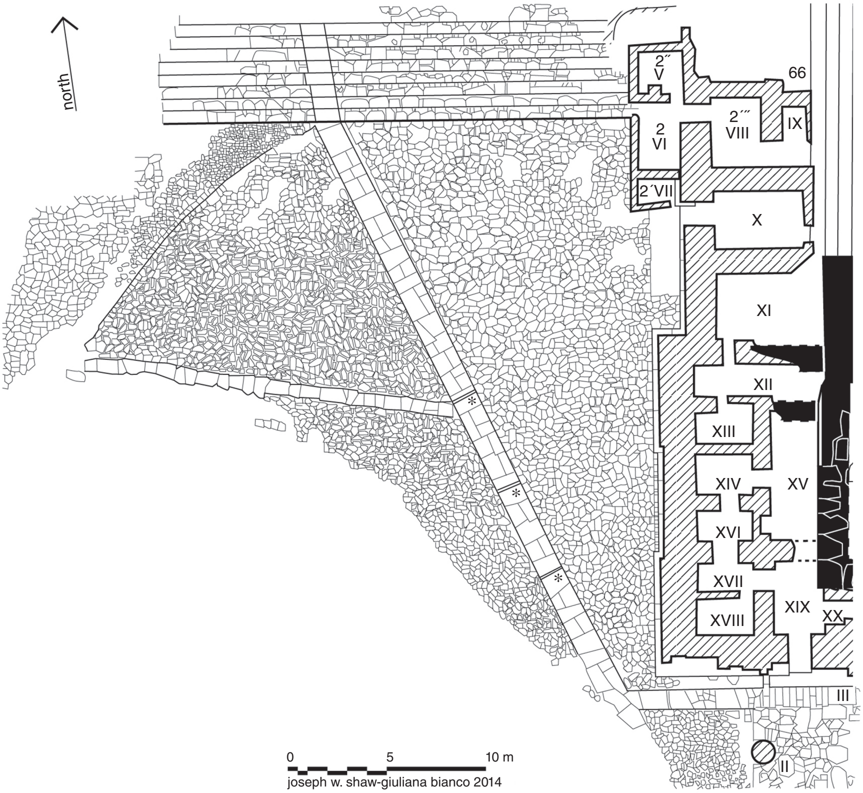

Fig. 10.7. Phaistos palace, partial plan of a portion of the MM court, showing part of the walkways and three of the narrow channels (drains?) marked with asterisks (plan by G. Bianco, adapted from Pernier 1935, plate V; courtesy of the Italian School of Archaeology and INSTAP Academic Press).

rise in sea level that has submerged many shorelines, with the waves causing much damage. Kommos, however, was only partly affected by the rise of 1.50 m or more in relative sea level, which destroyed the western parts of the Minoan buildings, as well as some Greek structures there.[3]

Regarding the later Greek and Roman periods, fortunately, a most detailed and useful book, *Shipsheds of the Ancient Mediterranean*, by David Blackman and colleagues, was published in 2013 (Blackman et al. 2013). There we learn that during the early Greek period, rival city states fortified their shorelines and adjusted their cities' perimeters. They also built long sheds along the shores, with the end of those buildings facing the sea. The ships, usually of military nature, were then pulled into those buildings, which were equipped with ramps on their interiors.

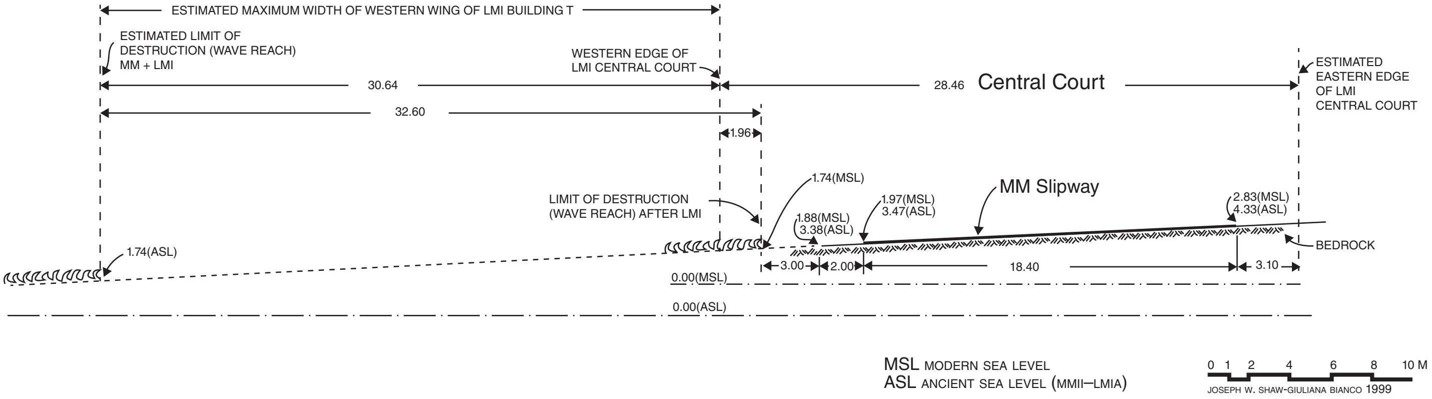
ESTIMATED MAXIMUM WIDTH OF WESTERN WING OF LMI BUILDING T
ESTIMATED LIMIT OF DESTRUCTION (WAVE REACH) MM + LMI
WESTERN EDGE OF LMI CENTRAL COURT
30.64
28.46
Central Court
ESTIMATED EASTERN EDGE OF LMI CENTRAL COURT
32.60
1.96
LIMIT OF DESTRUCTION (WAVE REACH) AFTER LMI
1.74(MSL)
MM Slipway
1.88(MSL)
3.38(ASL)
1.97(MSL)
3.47(ASL)
2.83(MSL)
4.33(ASL)
1.74(ASL)
BEDROCK
3.00
2.00
18.40
3.10
0.00(MSL)
0.00(ASL)
MSL MODERN SEA LEVEL
ASL ANCIENT SEA LEVEL (MMII–LMIA)
0 1 2 4 6 8 10 M
JOSEPH W. SHAW-GIULIANA BIANCO 1999

Fig. 10.8. Schematic estimate of limit of wave destruction along the shore in the Southern Area at Kommos (drawing by the author and G. Bianco).

On the basis of the remains described by Blackman and colleagues we can, briefly, compare the Greek with what little we know of prehistoric techniques of constructing and using such buildings. For instance, early in the Greek period, harbour-sides along an open coastline (e.g. Phaleron at Athens or Kommos in Crete) began to be abandoned in favour of 'closed' harbours with peninsulas along either side that could be closed off by building protecting moles and, sometimes, by connecting the ends of the moles with chains. Thus, both the towns and the shipsheds built along the shore could be protected from enemy incursions. From Phaleron, the Athenian harbour was transferred west to rocky Piraeus with its multiple, naturally enclosed harbours which, afterwards, were furnished with shipsheds along the shore. In an analogous manner, the Kommos town was transferred southwards to Matala, where a shipshed was set along the latter's southern promontory, probably during Roman times (Blackman et al. 2013: 239, 389–92).

Between the prehistoric and the Greek periods there was also a substantive architectural and topographic change, to judge from the two well-known examples of Kommos (Shaw 1985; Shaw 1999; Shaw and Shaw 2006) and Katsamba (Fig. 10.9), the harbour town or *epineion* of Minoan Knossos (Blackman 2011; Vasilakis 2010), whose shipsheds have been discovered only recently. At both Kommos and Katsamba, the shipsheds—covered or roofed slipways with each building with a number of galleries facing the sea, and with level floor—were set at least sixty metres from the sea. The ships were, likely, housed there for maintenance and repair, to protect them from damage, especially decay caused by fungus, the sun and the rain, and the teredo worm, during the winter months. Ships heading from the sea to the sheds would, therefore, have to be dragged stern first, by as many as 140 men during the Classical period (Blackman et al. 2013: 23),[4] and then up the sea slope and into the galleries which were open on the seaward end (as in Fig. 10.3). The open ends of the galleries were then set at the shoreline. The galleries were built one next to the other, probably with corridors between groups, and with interior ramps rising up so that the tethered ships within, could, in case of emergency, be unleashed, manned, and ready for battle.

Chapter 7, by Boris Rankov, in *Shipsheds of the Ancient Mediterranean* (Blackman et al. 2013: 102–23) deals with slipping and launching ships and, usefully for our purposes, describes slipways up and down which the ships were dragged (Table 10.1). Rankov also describes the wooden parts of slipways, which were placed beneath the ships and at right angles to their length, and upon which they were hauled. Then they were called phalanges or *palángia*, and are now referred to as sleepers or traverses.

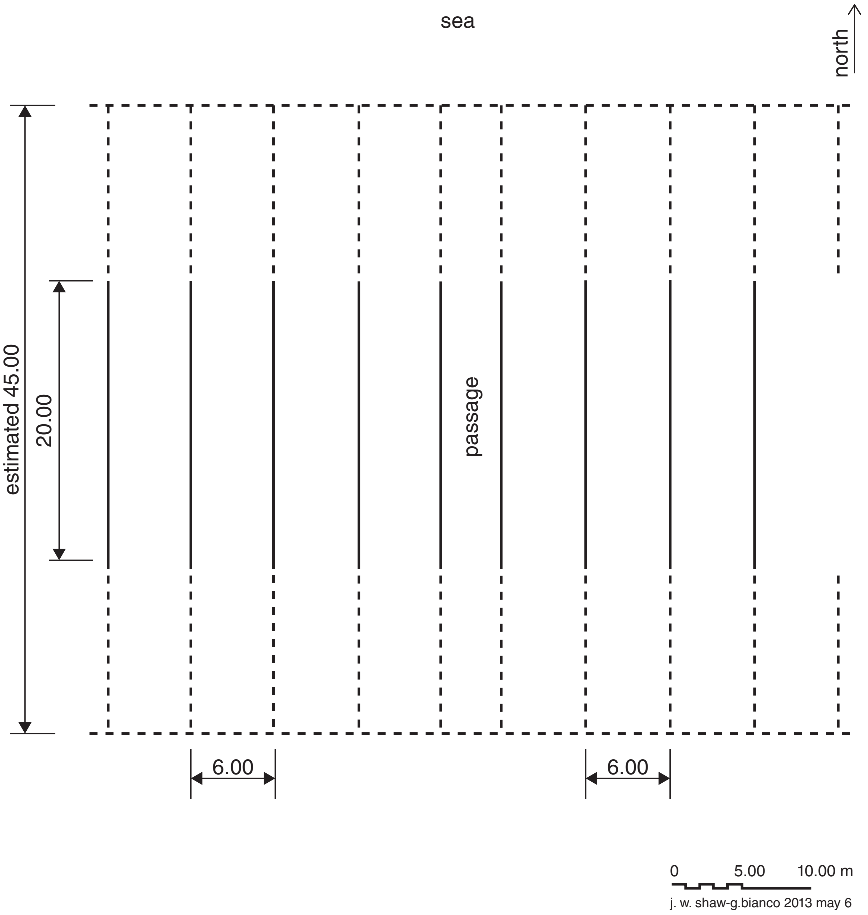

Fig. 10.9. Plan of Knossian port installation at Katsamba near the mouth of the Kairatos River (plan by the author and G. Bianco).

The Greek ships appear to have been beached on wooden sleepers (Blackman et al. 2013: 102). To launch a ship in an open air situation without a special slipway near the shoreline, the sleepers had to be 'laid within [an excavated trench], for the keel to slide over them and into the water.' (Blackman et al. 2013: 104). Timber sleepers, 0.15 by 0.10 m in section at Carthage, were spaced 0.60 m apart (Blackman et al. 2013: 317). Rollers could have been used as well, for they 'are simply rounded sleepers and perform exactly the same function, except that they reduce friction by rolling as the ship moves over them' (Blackman et al. 2013: 105). Sleepers and rollers have also been found together in an open slipping area in Marseilles (Blackman et al. 2013: 105).

Table 10.1. Comparative measurements of the Kommos (MM IIA), Kos, and Carthaginian slipways.

Slipway	Length of slipway (m)	Width of slipway ramp (m)	Est. sleeper width (m)	Space between sleepers (m)	Ramp inclination (°)
Kommos slipway; Minoan; Outdoors	18.40 min. (length partially preserved)	1.40 min.	0.15–0.20	2.40 (on centre)	4.67
Kos slipway; Eastern Aegean; 4th–3rd c. BCE; Within shipshed	37.00[a]	2.90–3.00[b]	/[c]	1.00 (on centre)[d]	5.2[e]
Carthage slipway; Tunisia; Hellenistic; Within shipshed	32.00–40.00[f]	4.00 (est.)[g]	0.15–0.20[h]	Range 0.60–2.25[i]	2.86–9.19[j]

[a] Scaled from Blackman et al. 2013: 366, Fig. B10.2.
[b] Blackman et al. 2013: 370. Actual interaxial use space perhaps 2 m.
[c] See n.9.
[d] Blackman et al. 2013: 367.
[e] Blackman et al. 2013: 367.
[f] Blackman et al. 2013: 315-316.
[g] Estimated from Blackman et al. 2013: 312, Fig. B5-2c.
[h] Blackman et al. 2013: 313, 317.
[i] Blackman et al. 2013: 312.
[j] Blackman et al. 2013: 316.

10.1.3. Towards an Understanding of the Slipway at Kommos

To fill out the picture of slipways, but in a modern context, archaeologist Cemal Pulak describes the situation in Bodrum, Turkey:

> We've done quite a bit of slipping our ship and watching how others are done in the traditional way in local Bodrum boatyards. There are no paved causeways, of course, since the boatyards prefer a gravelly beach, rather than a sandy one, so that the sleepers do not sink into the sand when the heavy boats are pulled up on them. Also, nearly all boats are hauled out of the water at these yards on wooden slipways, which consist of long sleepers secured to large timbers on either side, giving the whole contraption the appearance of giant ladders.
>
> When necessary, several slipways are placed end-to-end to extend their length in order to move the boat to any location on the beach.
>
> These wooden slipways are also moveable so that they can be positioned on the beach wherever there is an empty place to haul a boat. One thing that is not mentioned often when slipping boats is that the boats themselves are not pulled directly up on the sleepers, but on large wooden sledges. These sledges have two large runners, and one each is positioned on either side of the boat, the two are

> then secured together with the boat in the middle, and the whole unit, along with the boat riding it, is hauled up over the slipway on to the beach. The sledge or cradle with which the ship is hauled out of the water (on well-oiled sleepers lubricated with sheep fat), sometimes slides off to one side and falls off the sleepers. For this reason the vertical timbers at either end of the sleepers that connect them together are made higher and thus also serve to stop a sledge from falling off the sleepers. I was wondering if the plaster edging at Kommos, backed by stones, preserved in one place at the edge of your Minoan slipway could have served a similar purpose. But, then I decided against this because the edge construction you described seemed to be of fairly light construction, and it also did not appear to extend well above the ends of the sleepers so that it could effectively halt a sledge from lateral slippage.
>
> Once the boat has been pulled to the desired location, it is shored up with wooden chocks placed under the keel and its sides braced with wooden supports, and the sledge is then removed. I write all this because if the ancients also hauled their boats the same way, the sledge or cradle is rather wide—although usually a little narrower than the maximum beam of the boat—and will require a wide slipway. The Kommos slipway seems to have a width of only 1.4 m, which might not be wide enough for a boat of about 15 m in length. But, it is possible that the wooden sleepers could have extended well beyond the edge of the paved slipway on the Kommos site.[5]

An initial report about the pavement was also sent to engineer George Poulos of Toronto, for him to evaluate whether our pavement was actually for use by ships. He replied:

> My sketches [Fig. 10.10] were intended to investigate the feasibility of using the sloped pavement you found at Kommos as a slipway to be sure the forces were not too large. Marine engineering qualifications notwithstanding, I estimated the gross weights of the boat, also estimated the compressive bearing loads on the sleepers and keel, and verified loads were within the structural capability of oak that is available in Crete.[6] I assume ships ranging 35 to 75 feet in length and about a 27:1 range in terms of weight. The main area of uncertainty was the design of the hull, and most particularly the keel, if indeed there were keels in the modern sense. I assumed a substantial keel capable of handling the entire weight of the boat *which is essential for a narrow slipway.*
>
> I concluded that stationary sleepers are a reasonable way of distributing the loads so that the forces on the timbers do not exceed the compressive strength of the timbers. You can see that from my sketch. This was its primary purpose. Wooden rollers are highly doubtful. Stationary sleepers need to be prevented from moving *in keeping with the gaps in the paved ramp.*
>
> The specific details used by the ancients to keep the boat from sliding laterally over the sleepers, distribute the loads evenly over all sleepers to prevent failure in compression, to prevent the sleepers from moving while pulling the boat over them, and keep the boat upright, and attaching pulling cables to the boat, are not known since I understand we don't have clear evidence on this subject dating from the period.

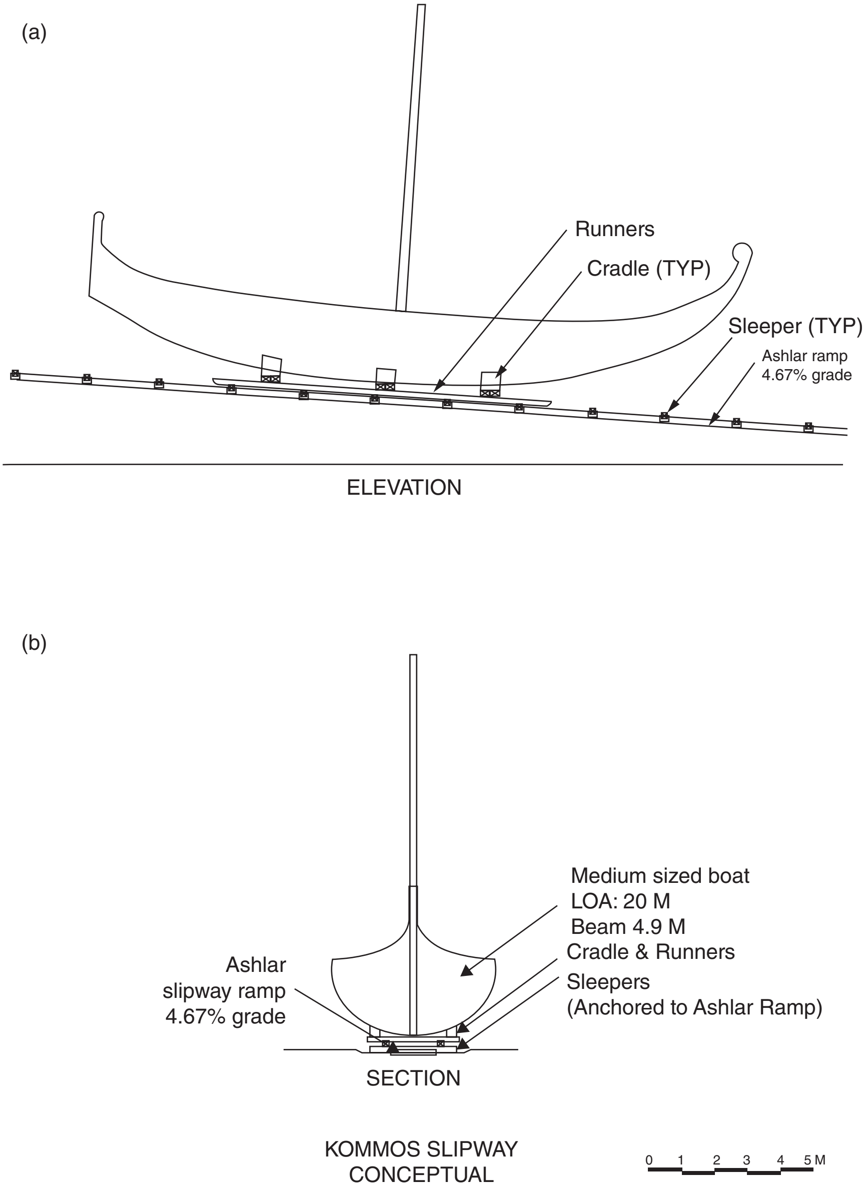

Fig. 10.10. (a) Conceptual slipway section with ashlar ramp and the ship cradle imagined (neither the ramp nor cradle are known from Aegean prehistory). (b) Estimate of how a wooden ship might fit on to the Kommos slipway (drawing by engineer G. Poulos, with permission). The ship has an Egyptian outline.

> But nevertheless, *assuming that the boats of the period had keels capable of handling the entire weight of the boat*, I have concluded that you have a reasonable hypothesis that the paved ramp you found at Kommos was indeed a slipway.[7]

In the archaeological record, outdoor slipways such as that at Kommos are rare. As argued by Blackman and Rankov: 'Open-air slipways may have been missed in archaeological exploration because they are less easy to identify, not having the tell-tale parallel walls [of the shipsheds] c. 6m apart.' (Blackman et al. 2013: 138). On the other hand, the interiors of the slipway sheds, which housed ramps upon which the ships were set, were probably analogous in construction technique. For instance, a ramp at Kos was paved with cement, overlaid with earth or sand fill, and was fitted with wooden sleepers set at intervals (Blackman et al. 2013: 366–71), as restored in Figure 10.11 and Table 10.1.[8] The analogy, there, is obvious in the setting of parallel sleepers, like those at Kommos, and like the rungs of a ladder, at right angles to the length of the slipway.

Finally, and to continue with the Kommos pavement (Fig. 10.6), it appears that the Greek setting of wooden sleepers at intervals—either in the open air or within the sheds themselves—provides an excellent, even if later, parallel for our sloping Kommos pavement, which we can now identify with some confidence as a slipway for ships in which the gaps serve as sockets for the greased sleepers upon which ships could slide (Fig. 10.12).[9] The narrowness of the pavement—about 1.4 m—and the lack of substantial contemporary remains nearby (Shaw and Shaw 2006, plate 1.32) seem to confirm that the pavement was in the open air, and led some metres from the shoreline eastward to its destination. Perhaps we are dealing with a single ship, pulled up on the pavement in the open, then propped, or perhaps with a storage building for a ship, razed when Middle Minoan IIB Building AA was being constructed.

10.1.4. Nautical Installations at Kommos

From the point of view of architecture at least partially devoted to nautical purposes at Kommos harbour, we now can note:

- MM I or early MM II. The slipway featured here (Fig. 10.6);[10]
- MM IIB Building AA. Found incomplete, but possibly connected with storage of imports or goods to be sent abroad;
- MM III Building T. Thought by some to have housed ship sheds (Plath 2011; Puglisi 2001);[11]
- LM IIIA2 Building P (Fig. 10.3). One shipshed building with six galleries, also seagoing anchors recovered, and numerous pottery remains from abroad (Rutter 2006: 859–63; Shaw 1995; Van de Moortel 2006: 856–9).

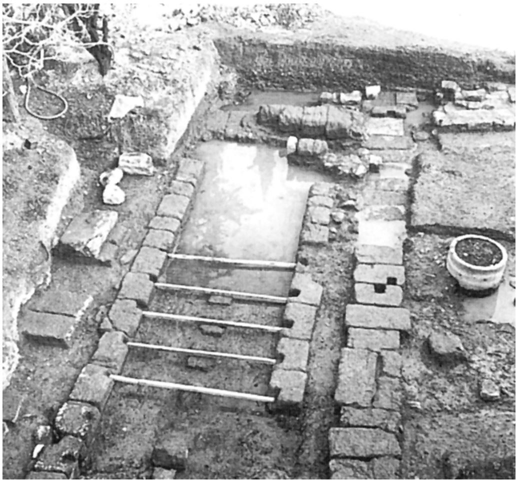

Fig. 10.11. Kos shipshed 1, from south, looking towards the sea, showing interior of shipshed with some wooden sleepers replaced (after Blackman et al. 2013: fig. B10.4, with permission; courtesy KB' Ephoreia).

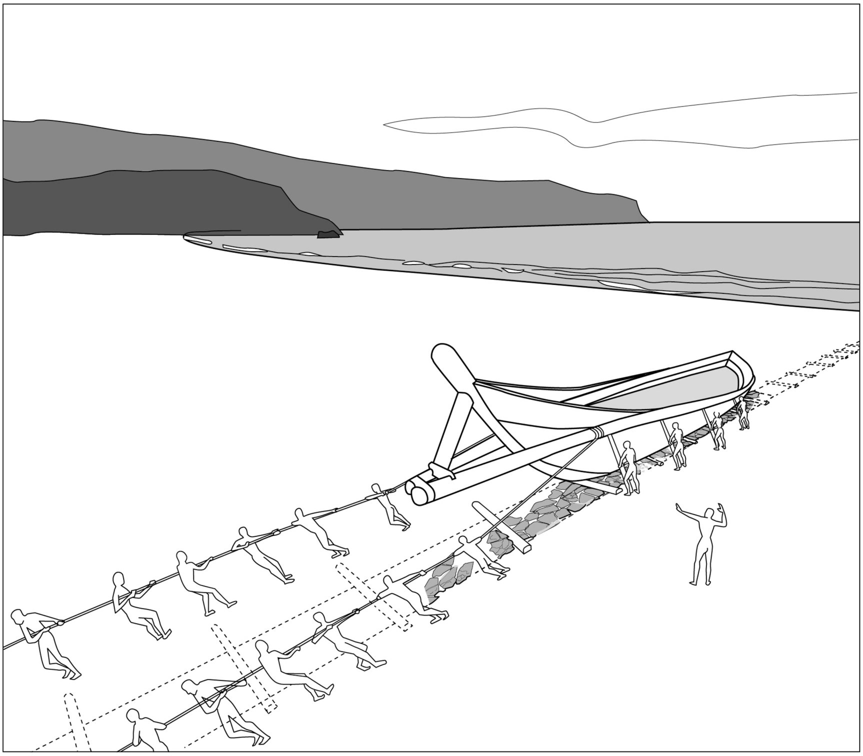

Fig. 10.12. A ship being pulled up the Kommos slipway (drawing by the author and G. Bianco).

This sequencing for the earlier part of Kommos history seems to coincide with recent geological opinion. Fytrolakis et al. (2005), for instance, proposed that the use of the Kommos shoreline for harbourage began toward the end of the Early Minoan period due to the blockage of an embayment that once allowed ships to access both Haghia Triada and Phaistos along the north side of the Phaistos ridge (see also Plath 2011, forthcoming; Shaw and Shaw 2012: 47, n.1) (Fig. 10.13). Early settlement at Kommos does coincide with such a scenario (Betancourt 1990: 22 et seq., 191; Shaw and Shaw 1996: 392–8).

10.1.5. Some Additional Questions

Based on its location near and orientation to the sea, the identification of the paved way at Kommos as a slipway is, in my view, likely. Furthermore, its unusual composition of slabs, with wooden sleeper beams set parallel to one another, as in a ladder, is similar to the later slipways of Greek shipsheds. For a sceptic, however, there is, still, room for doubt, so we should bring up a few questions worth asking.

For instance, bits of plaster were found alongside the northern side of the paved way—what was their function, or were they unconnected with the paved way itself? Perhaps if it is cleaned we may learn more, and more about the sizes and shapes of the wooden sleepers that presumably were set in the gaps. Also, why is the easternmost gap skewed? Is it by chance, or have we reached the end of the pathway? Could it indicate a change of direction, showing that the paved way turned toward the north?

Some more general questions can also intrigue us. Why, for instance, is the paved way with gaps the only one found at Kommos? We should note, however, that it underlay the two later court levels of Buildings T and P, and there may be more involved than we can see now. For instance, the paved way lies midway, north–south, between the two colonnaded *stoas* of Buildings AA, T, and P, and its position may not be explained simply by chance. And why don't we have slipways leading down to the sea from in front of the long and wide, parallel galleries, the shipsheds, of LM III Building P? There are no simple answers, but perhaps our slipway type went out of use after MM IIA, and loose rollers replaced the sleeper type we have studied here.

Time, also, is an element, here, in the case of Building P. For instance, when Maria Shaw (1985) first identified it as a building for housing ships, some doubts were expressed, for up to then the shipshed building type was thought to have been restricted to the Greco-Roman period (Blackman 2011: 5). But in 2010, and with the partial publication of the discovery of two similar buildings at Katsamba by Antonis Vasilakis (2010) (Fig. 10.9), the hypothesis became more widely accepted (Blackman 2011).

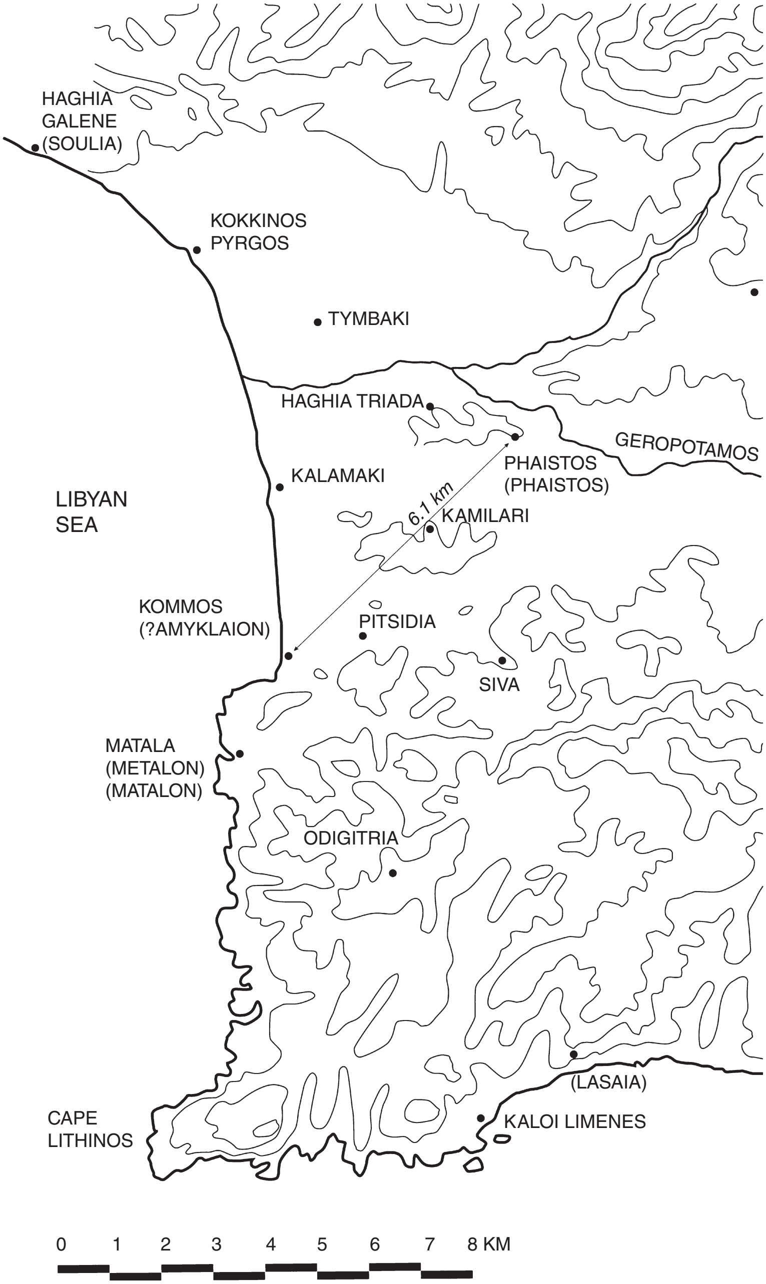

Fig. 10.13. Plan of the Western Mesara, with the west-flowing Geropotamos River next to Haghia Triada and Phaistos, with the site of Kommos to the south-west (from Shaw and Shaw 1995, frontispiece).

10.2. PREHISTORIC CRETAN SEAPORTS: A BRIEF REVIEW

It is interesting and important to place the Kommos slipway, just discussed, within a broader discussion of Cretan seaports. For instance, if we continue momentarily with Kommos, it is now widely recognized as the harbour town, or *epineion*, of contemporary Phaistos and Haghia Triada, both some three to four kilometres inland (Fig. 10.13), with Kommos some six kilometres to the south-west. To reach Kommos from Phaistos in Minoan times, one would walk a few hours to the south-west, through the plain, then south-east around the Kamilari hills, or else slog south along the sandy seaside track with its dunes and low hills lining the Mesara shoreline. When bulk goods were being shipped inland from Kommos, donkeys or, sometimes, donkeys or oxen pulling carts (Fig. 10.14) could be used. The teams probably lined up along the shoreline, not far from the storerooms, then would leave the town via the broad east–west paved avenue separating the town with its residences from the civic buildings (Fig. 10.3, left).

But were the goods they were carrying bound for either Phaistos or Haghia Triada? Normally, one would argue it was to both sites, especially during the First Palace Period. But according to our Italian colleagues, during one period (MM IIIB–LM IA), activity was limited at Phaistos, and that was the period when large buildings were constructed at Haghia Triada and Kommos (Cucuzza 1992: 62; La Rosa 1995: 890; see also Shaw 2015: 127, 164, 170–2).[12] Knossos, therefore, may very well have played a substantial role in the process, something that Evans—who first pointed out the site of Kommos although he never excavated there—would have been pleased to hear. He wrote, for instance that the routes leading to the site in south-central Crete represented the 'central authority which the lords of Knossos seem to have wielded in the great days of Minoan civilization' (Evans 1928: 91; for an expanding Knossos during the Neopalatial period, see also chapter 7).

At that time the trip to Knossos from the Mesara lasted at least two days, most likely leading north up a well-known track in the Platyperama valley and then north-eastwards around the foothills of Mount Ida. Evans himself made the trip with his caravan in the 1920s (Evans 1928: 60–92). In 1975, L. Vance Watrous and the present author hiked from Amnisos to the Mesara, in the same valley and to the east of the route presently taken by the modern asphalt highway.[13] Although any other significant remains of the Minoan road have been bulldozed away during recent road-clearing operations, along the approach to Ayios Thomas we found remains (also illustrated by Evans) of cyclopean walls supporting and bordering a narrow way clearly made for beasts of burden. Nearby, unnoticed by Evans, was a Minoan dwelling, to judge from the sherds recovered not far from the 'road'. Following Evans's logic, the remains should be attributed to a Minoan 'station' guarding the

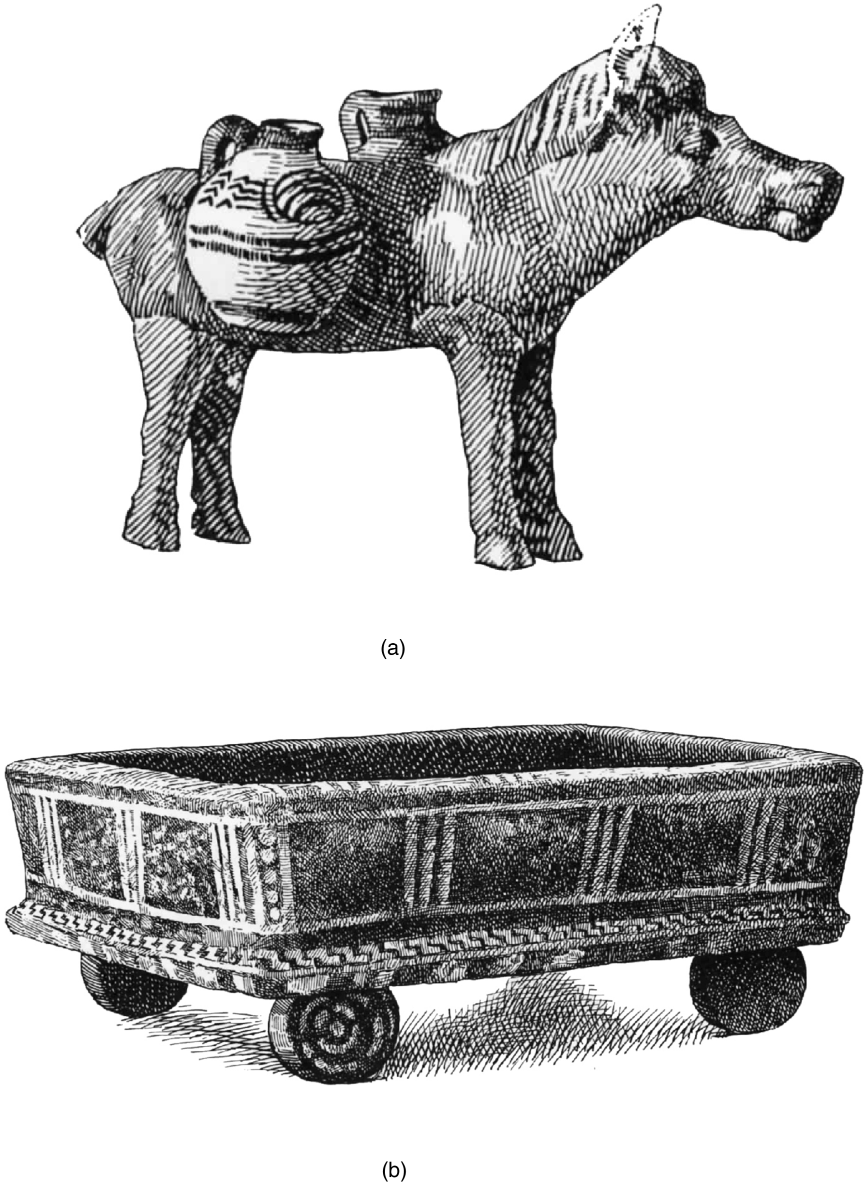

Fig. 10.14. (a) Miniature clay figurine of a donkey from Phaistos; (b) terracotta wagon from Palaikastro (after Evans 1928: figs 78–9).

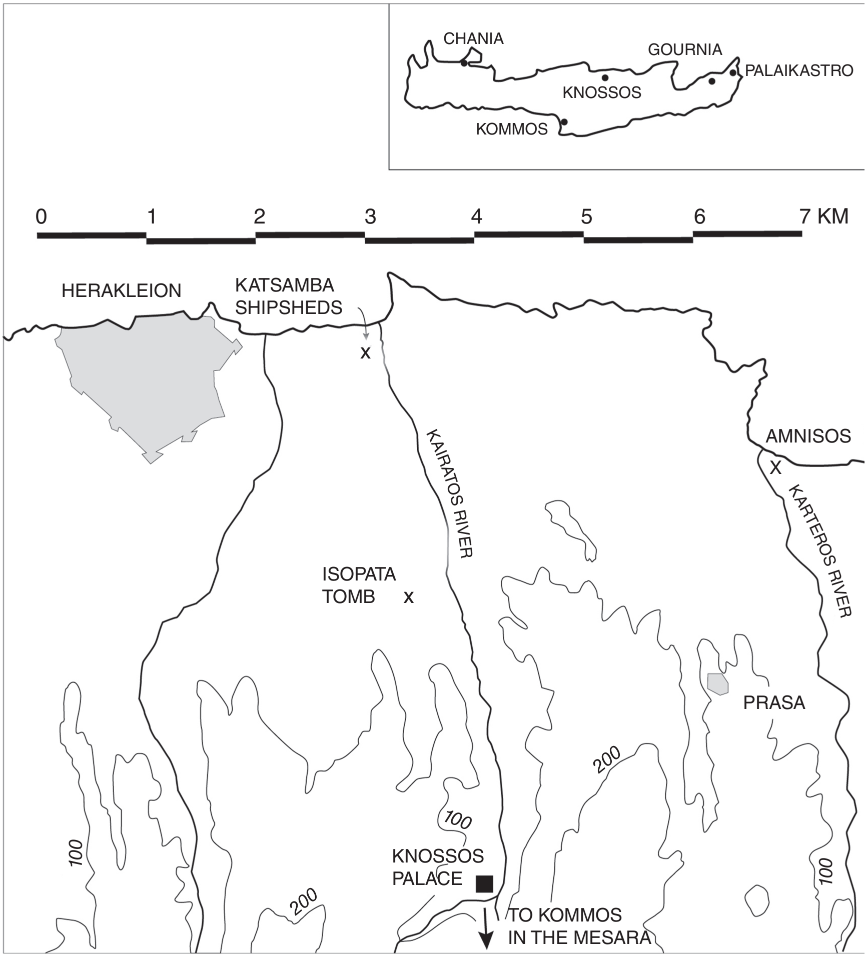

Fig. 10.15. Map of north-central Crete showing Knossos with its two harbour sites at Katsamba and Amnisos (after Hood and Smyth 1981: fig.1; reproduced with permission of the British School at Athens).

road. In my view, however, the presence of Minoan remains along a natural route for a roadway simply indicates that the Minoans did live here and that they used a road nearby (see also Shaw 1977: 201, n.8).

If there is doubt whether Knossos controlled, even built, the southern port of Kommos, there is no doubt that Knossos had not one but two ports on the seaside to the north (Fig. 10.15). One, Amnisos, is mentioned by Homer:

> He [Odysseus] stopped at Amnisos, where there is a cave of Eileithyia,
> in difficult harbors, and barely he had escaped from the stormwind.
> He went up to the town [Knossos] at once, and asked for [King] Idomeneus.[14]

Amnisos is a stretch of coast with a hill at its centre, the outflow of the Karteros River at its western end, and a small offshore islet. When excavated, the area proved to have an opulent Minoan villa east of the hill, and a Greek shrine to Zeus Thenatas along the hill's western periphery (for a thorough review of excavations by Marinatos, Alexiou, and Schäfer, see Schäfer 1991; Schäfer et al. 1992).[15] North of the hill, awash in the sea, are a number of Minoan houses, including one with a limestone threshold (Schäfer et al. 1992, fold-out plan 4). The last can serve as indication that the relative sea-level in the area has risen at least two metres, similar to the situation discussed at Kommos (see section 10.1.2 and Fig. 10.8). As far as I know, however, excavation has not taken place at the western end of the Amnisos shoreline, near the mouth of the Karteros River. I believe that it is likely that there was the preferred landing spot for ships, with a sandy rather than a rocky beach, and sheltered from the prevailing northern wind by the cliffs of the peninsula projecting northward there.

To reach Knossos from Amnisos, about seven kilometres away, one usually followed the shoreline to the west, then met up with the main north–south track that led up the Kairatos river valley (Fig. 10.15), which may have been partially navigable during the rainy season (generally, from November to February). Uphill, and toward the source of the river, lay the large city of Knossos, which may have numbered some 25,000 people.[16] At the mouth of the Kairatos river where it reached the sea (Figs 10.15, 10.16) was, Evans believed, the 'principal haven' of Knossos. His belief derived from the amount and quality of Minoan material, chiefly seals and pottery, that he recovered throughout the area, especially just west of where the river met the sea. His intuition was confirmed recently when the Greek Archaeological Service discovered at Katsamba, within an empty lot in a densely built-up area of apartment buildings, the remains of shipsheds (Blackman 2011: 6; Vasilakis 2010) (Fig. 10.9), similar to those at Kommos, already discussed here (see section 10.1 and Fig. 10.3, right).

The Katsamba buildings were found largely destroyed, perhaps by a tsunami wave generated by the volcanic eruption of the island of Santorini, north of Crete. There were parts of two buildings, divided by a central passageway. Both the Kommos and Katsamba buildings (see also Table 10.2):

- had a common orientation at right angles to the sea;
- had unusually long, parallel galleries 4.5 m to 6 m wide and 38.38 to *c.* 45 m long. At least five of the Kommos galleries were permanently open to the sea;
- were set some 100 to 150 m back from the ancient shoreline, at about 3.50 to 4.50 m above the sea level at the time.

Two other Minoan port towns, Gournia and Palaikastro, should be discussed here. Both are some distance east of Katsamba (Fig. 10.15, inset). The

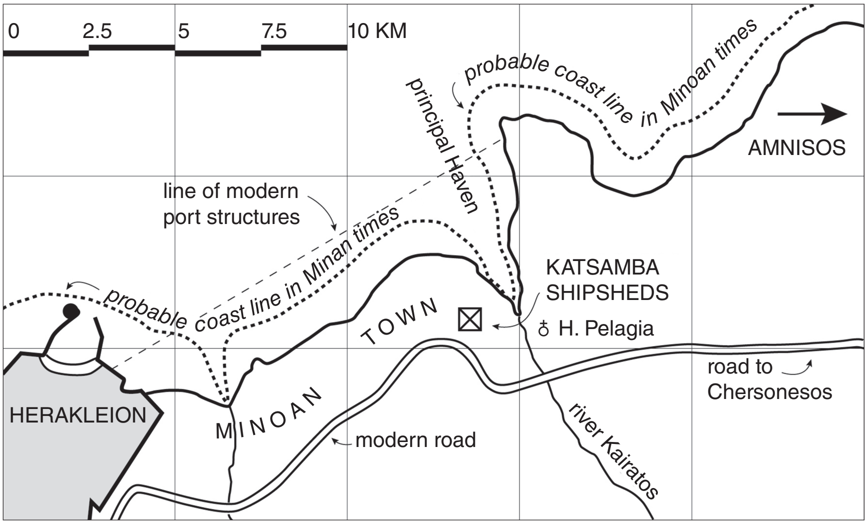

Fig. 10.16. Map of area of the Katsamba harbour, just east of modern Heraklion (Candia) (after Evans 1928: fig. 131a, with the help of T. Whitelaw, who furnished an aerial photograph indicating the position of the Katsamba shipsheds).

Table 10.2. Some measurements of Neopalatial Minoan shipsheds facing the sea.

Shipsheds at site	Date	Number of galleries	Length of galleries (m)	Width of galleries (m)	Distance from shoreline then/ now (m)	Elevation of floor level then/now above sea level (m)
Gournia	LM I	2	13 min. (west) 9 m (east) 40 total?	4 (west) 5 (east)	Not clear[a]	Then *c.* 4.5
Kommos (Building P)	LM III	6	38.38	Range 4.43 (P6)–5.74 (P3)	Then *c.* 100 Now c. 30	Then c. +4.50 Now c. +3.00[b]
Katsamba (two adjacent buildings)	LM I, LM III	3 + 3?	20 min. 45 max.	c. 6	Then *c.* 150? Now obscured by modern buildings	Then 4.00? Present difference *c.* 1.50–2.00

[a] Not clear. 'The promontory was 60 m longer then and would have served as a natural wharf for ships (Watrous 2012: 523).

[b] See n.4.

[c] Levels are not available. Estimate made by guess.

Gournia town (cf. Fig. 9.1), presently under excavation, is usually taken to be representative or 'typical', and one can literally see all of it in one glance from a neighbouring hill (see chapter 9). The chief settlement is on an inland hill with a small palace encircled by rings of roads with houses on either side, with a road leading down to the harbour-side (cf. Fig. 9.2). The latter had a jagged, precipitous, harbour front with evidence of tie-ons or bollards, now under water, for docking ships, and also a now-submerged flight of steps. On a small promontory there are the remains of a medium-sized building (A in Fig. 10.17), called the 'Shore House' by Harriet Boyd Hawes (Boyd Hawes et al. 1908), the first investigator at Gournia. Since then the northern part of the building has been recognized by L. Vance Watrous, the present chief investigator of the town, as about a fourth of what was originally a double-galleried shipshed. The building's walls are of rubble, and the widths of the galleries are about 4 m (west) and 5 m (east), with a maximum preserved length of 13 m (Watrous 2012: 527). Watrous estimates that the sea has claimed about two-thirds of their original length, which was about 40 m if they conformed to what is known elsewhere (see also Table 10.2). He estimates that the ancient sea level was about 2.5 m below what it is now, similar to our estimations for Kommos, Katsamba, and Amnisos.

The estimates for the three sites are so similar that one is tempted to look for more shipshed-like buildings facing the sea at prehistoric Aegean harbour-sides. Moreover, if it were possible to find similar buildings on sites where the original Bronze Age sea level is unknown, the prehistoric relative sea-level at those sites could be estimated. On an island such as Crete where relative sea levels can vary, especially along its western shores, a 'measuring rod' could thus be provided by shipshed-like structures discovered there.

A case in point is Palaikastro (Fig. 10.18), also called Roussolakkos, where ancient sea-levels have not been closely estimated. A significant portion of the Neopalatial town has been excavated, with much of it buried after study and so no longer visible (for a general summary of the Palaikastro area, see MacGillivray et al. 1984). Along the shoreline, some two hundred metres east of the excavated settlement, Minoan buildings can be seen, on the promontory but also awash in places, and extending out some distance into the sea. It is clear that, as at the other sites I have investigated here, the relative water level has risen at least two metres since Minoan times. None of the buildings discovered so far, however, can be identified as shipshed-like.[17] If there were any, either on land below sand and debris or partly buried in sand in shallow water, they would help refine this estimate. Where could the actual Late Minoan harbour be, however? In 1984 it was thought to be near the promontory 'since it is by far the most sheltered section of the coastline at Palaikastro. The harbour front itself must originally have been some distance further to the north-east in an area now submerged' (MacGillivray et al. 1984: 140).

One hint might be that one of the main roads of the Palaikastro settlement (Fig. 10.18) appears to run almost parallel to the seashore. Perhaps if its

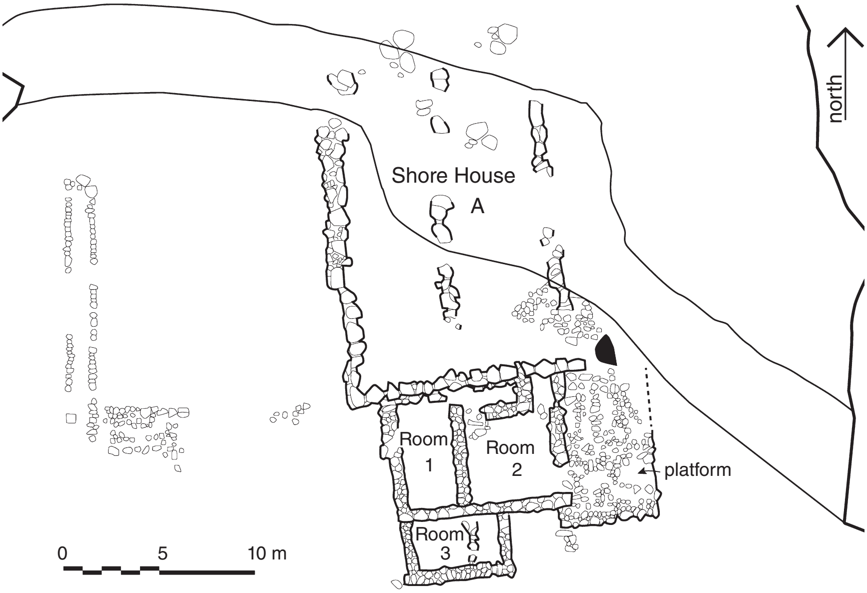

Fig. 10.17. Map of Gournia Shore House area with its two fragmentary shipsheds at centre, right (from Watrous 2012: fig. 6; courtesy L. V. Watrous and the American Journal of Archaeology).

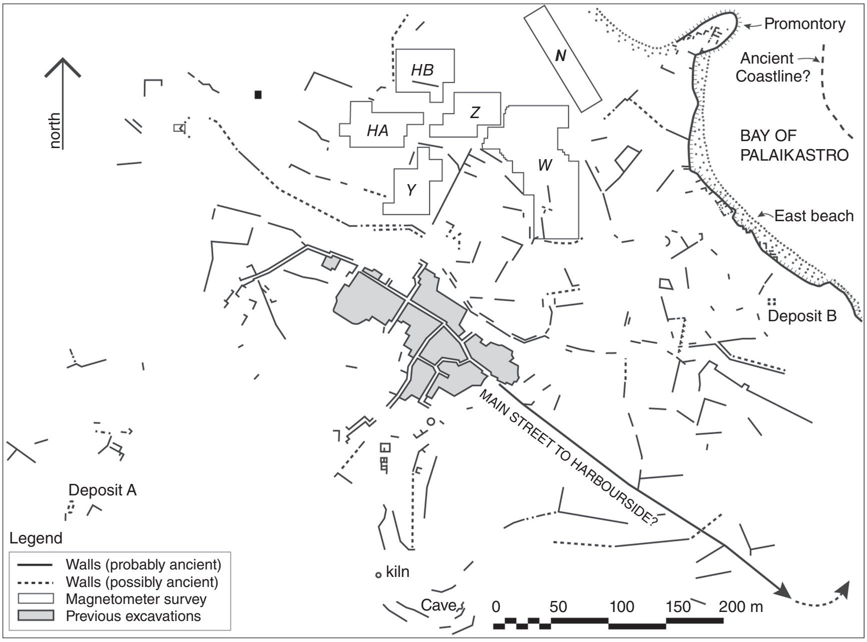

Fig. 10.18. Plan of the Palaikastro area, showing location of the main settled area (Roussolakkos) (redrawn by G. Bianco, after MacGillivray et al. 1984: fig. 2; reproduced with permission of the British School at Athens).

extension were to turn eastward toward the shore, as may have happened at Kommos (Fig. 10.3), that would be the point where offloading might be expected to have taken place. There, also, the vessels may have been stored in sheds during the winter months.

10.3. CONCLUSION

Incremental excavation and follow-up research is contributing to our learning about Minoan harbour-sides—where they were and how may have appeared. Here I introduced a new form, the slipway, and have also discussed the use of shipsheds that, up until recently, were thought to have developed and been used only during the Greek and Roman periods. As David Blackman (2011) has pointed out, our understanding of Bronze Age Aegean marine architecture is gradually progressing as we advance in our knowledge of the dynamics of major seaside settlements.

ACKNOWLEDGEMENTS

I am indebted for the help of many during the writing of this short essay, and especially to Maria Shaw for her advice, Giuliana Bianco for her expertise in drawing, and to David Blackman and Cemal Pulak for their support and expertise in nautical architecture. George Poulos, Jeremy Rutter, and Seungjung Kim have also helped significantly. For their help with harbour sites they are best acquainted with, I am indebted to Todd Whitelaw (Katsamba), L. Vance Watrous (Gournia), and Carl Knappett (Palaikastro).

NOTES

1. For the area with the slab paving mentioned in the text see Shaw and Shaw 2006: 10–11, 98–9, and 323. For its original plan of the slab paving, adopted in Fig.10.6, see Shaw and Shaw 2000, fold-out plate E. For the specific trench involved (Trench 65A7 of 1985), see the reports by Trench Master Barbette Spaeth at <https://tspace.library.utoronto.ca/handle/1807/3004>.
2. This, and the areas within the gaps separating the slabs, should be investigated in the future.
3. Our original estimate of relative sea level change at Kommos was made in 1995 by geologist John Gifford (1995: 79), where the change between the present and prehistoric levels at Kommos is 'between 2 and 3 meters below the present level'. Another estimate was made in 1996 (Shaw and Shaw 1996, plate 1.1), where a

greater rise, of 2.60 m, is proposed. Restudy, published in 2006 (Shaw and Shaw 2006, pl, 1.4; Fig. 7.8 here) estimates a difference of *c.* 1.50 m, which could well be an underestimate.

4. Earlier, prehistoric ships may have been smaller and required less manpower.
5. Personal correspondence, 4 October 2014.
6. Or cypress or fir. For the evidence for the use of wood in ancient Crete, see Shaw 2009: 91. For the general use of wood types in shipping, see Steffy 1994: 256–9. For the late fourteenth-century BCE shipwreck at Uluburun, where parts of the hull of cedar (Cedrus) was beautifully preserved, see Pulak 1999a: 212 (originally identified as fir in Bass 1987: 708, 722).
7. Personal correspondence, 4 October 2014. The emphases are Poulos's own.
8. Engineer George Poulos has made a reasonable suggestion that the rectangular notches in the ashlars set on either side of the slipway in Fig. 10.10 were to accept not the thin beams set into them by the archaeologists but, rather, the tangs from a much wider beam. Indeed, the entire surface of the slipway surface could have been wooden.
9. In Fig. 10.12, the form of the ship being hauled up the slipway from the sea, especially the stern, is based partly on the oared ships shown in the sixteenth century BCE Theran miniature frescos from Akrotiri (Doumas 1992, plates 35–6), also from the model of those same ships, especially their sterns, in the Maritime Museum of Crete at Chania, Crete. The late fourteenth-century cargo ship wrecked at Uluburun was also informative. Its keel was adopted in our Fig. 10.6 (inset) (Pulak 1999b: 18; see also Pulak 1999a, 2002) and Fig. 10.12 (Bass 1987: 694–6).
10. It is worth inquiring why other slipways with similar construction have not appeared, for instance at the Kommos site, with Building P. Perhaps by that time (LM III), rollers, which would have disappeared from archaeological record, had replaced pavements with gaps for sleepers.
11. The possible evidence was presented in Shaw and Shaw 2006: 40–55 and 847–50.
12. As to Kommos, if activity at Phaistos were limited, then it would seem unlikely for locals to be doing much building elsewhere during MM III. Could the rule have passed from Phaistos to Haghia Triada? See also Shaw and Shaw 2006: 866–71, Table 5.1 for building activity at the Kommos site during MM III.
13. Of some interest is that the still unopened, new highway leading south-west from Haghia Varvara will take a direction much closer to that of the ancient route leading from the area of Phaistos to Knossos.
14. *Odyssey* Book XIX, lines 188–90 (translation from Lattimore 1967: 287).
15. Recent cleaning, still unpublished, has clarified some of the Minoan structures incorporated into the later shrine of Zeus.
16. I am indebted to Todd Whitelaw for this figure, which is based on a Neopalatial city of 1 square kilometre on an extensive suburb on the summit of Ailias.
17. The 'house on the promontory' (MacGillivray et al. 1984: 137–8, fig. 4, upper right) consists of some three partly preserved rooms extending out to the east. Its northern two rooms have widths of three and four metres. This is a candidate for a shipshed with at least three galleries, but only about five metres of length are preserved, and three metres may be too narrow for a gallery.

REFERENCES

Bass, G. 1987. 'The Oldest Known Wreck Reveals Bronze Age Splendors'. *National Geographic* 172.6: 693–733.

Betancourt, P. 1990. *Kommos II: The Final Neolithic through Middle Minoan III Pottery*. Princeton, NJ: Princeton University Press.

Blackman, D. J. 2011. 'Minoan Shipsheds'. *Skyllis. Journal for underwater archaeology* 11.2: 4–10.

Blackman, D. J., B. Rankov, K. Baika, H. Gerding, J. McKenzie, and J. Pakkanen. 2013. *Shipsheds of the Ancient Mediterranean.* Cambridge: Cambridge University Press.

Boyd Hawes, H., B. E. Williams, R. B. Seager, and E. H. Hall. 1908. *Gournia, Vasilike and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete*. Philadelphia, PA: The American Exploration Society Free Museum of Science and Art.

Cucuzza, N. 1992. 'Mason's Marks at Haghia Triada'. *Sileno. Rivista di studi classici e cristiani* 18: 53–65.

Doumas, C. 1992. *The Wall Paintings of Thera*, Athens: Thera Foundation.

Driessen, J. 2009. 'Daidalos' Designs and Ariadne's Threads: Minoan Towns as Places of Interaction'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 41–54.

Evans, A. 1928. *The Palace of Minos at Knossos II.* London: Macmillan.

Fytrolakis, N., A. Peterek, and B. Schröder, 2005. 'Initial Geoarchaeological Investigations of the Holocene Coastal Configuration near Phaistos/Agia Triada (Mesara Plain, Central Crete, Greece)'. *Annals of Geomorphology* 137: 111–23.

Gifford, J. W. 1995. 'Chapter 3: The Physical Geology of the Western Mesara and Kommos'. In *Kommos I. The Kommos Region and Houses of the Minoan Town*, edited by J. A. Shaw and M. C. Shaw. Princeton, NJ: Princeton University Press: 30–90.

Hood, S. and D. Smyth. 1981. *Archaeological Survey of the Knossos Area.* London: British School at Athens.

La Rosa, E. 1995. 'A Hypothesis on Earthquakes and Political Power in Minoan Crete'. *Annals of Geophysics* 38: 881–91.

Lattimore, R. 1967. *The Odyssey of Homer: Translation with an Introduction by Richmond Lattimore,* New York: Harper & Row.

MacGillivray, J. A., L. H. Sackett, D. A. Smyth, J. Driessen, D. J. Lyness, B. A. Hobbs, and A. A. D. Peatfield. 1984. 'An Archaeological Survey of the Rousolakkos Area at Palaikastro'. *Annual of the British School at Athens* 79: 129–59.

Pernier, L. 1935. *Il Palazzo minoico di Festòs I.* Roma: Libreria dello stato.

Plath, G. 2011. 'Minoischen Hafenanlagen'. In *Inseln der Winde: Die maritime Kultur der bronzezeitlichen Ägäis*, edited by T. Guttandin, D. Panagiotopoulos, H. Pflug, and G. Plath. Heidelberg: Institut für Klassische Archäologie Universität Heidelberg: 136–57.

Plath, G. Forthcoming. 'The Correlation of Kommos and Agia Triada under Aspects of Coastal Alteration'. In *Tropis X: 10th International Symposium on Ship Construction in Antiquity.*

Puglisi, D. 2001. 'Un arsenale marittimo l'edificio T de Kommos?'. *Creta Antica* 2: 113–24.

Pulak, C. 1999a. 'The Late Bronze Age Shipwreck at Uluburun: Aspects of Hull Construction'. In *The Point Iria Wreck: Interconnections in the Mediterranean, ca. 1200 BC*, edited by W. W. Phelps, Y. Lolos, and G. Vichos. Athens: Hellenic Institute of Marine Archaeology: 209–38.

Pulak, C. 1999b. 'Hull Construction of the Late Bronze Age Shipwreck at Uluburun'. *The INA Quarterly* 26.4: 16–21.

Pulak, C. 2002. 'The Uluburun Hull Remains'. In *Tropis VII: 7th International Symposium on Ship Construction in Antiquity*, edited by H. Tzalas. Athens: Hellenic Institute for the Preservation of Nautical Tradition: 616–36.

Rutter, J. B. 2006. 'Ceramic Evidence for External Contact: Neopalatial and Postpalatial'. In *Kommos* V. *The Monumental Minoan Buildings*, edited by J. W. Shaw and M. Shaw. Princeton, NJ: Princeton University Press: 859–63.

Schäfer, J. 1991. 'Amnisos—Harbour-Town of Knossos ?'. In *Thalassa. L'Égée préhistorique et la mer* (Aegaeum 7), edited by R. Laffineur. Liège: Université de Liège: 111–15.

Schäfer, J., S. Alexiou, P. Brize, A. Chaniotis, W. Helck, S. Hiller, P. Knoblauch, W.-D. Niemeier, E. Stefanaki, and V. Stürmer. 1992. *Amnisos: nach den archäologischen, historischen und epigraphischen Zeugnnissen des Altertums und der Neuzeit.* Berlin: Greb. Mann Verlag.

Shaw, J. W. 1977. 'Excavations at Kommos (Crete) during 1976'. *Hesperia* 46: 199–240.

Shaw, J. W. 1995. 'Two Three-Holed Anchors from Kommos'. *International Journal of Nautical Archaeology* 24.4: 279–91.

Shaw, J. W. 1999. 'A Proposal for Bronze Age Aegean Ship-sheds in Crete'. In *Tropis V: 5th International Symposium on Ship Construction in Antiquity*, edited by H. Tzalas. Athens: Hellenic Institute for the Preservation of Nautical Tradition: 369–92.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. Padua: Aldo Ausilio.

Shaw, J. W. 2015. *Elite Minoan Architecture: Its Development at Knossos, Phaistos, and Malia*. Philadelphia, PA: INSTAP Academic Press.

Shaw, J. W. and M. Shaw (eds). 1985. *A Great Minoan Triangle in Southcentral Crete: Kommos, Hagia Triadha, Phaistos. Scripta Mediterranea VI (Special issue)*. Toronto: Canadian Institute for Mediterranean Studies.

Shaw, J. W. and M. Shaw. 1995. *Kommos I: The Kommos Region and Houses of the Minoan Town,* Part I: *The Kommos Region, Ecology and Minoan Industries*. Princeton, NJ: Princeton University Press.

Shaw, J. W. and M. Shaw. 1996. *Kommos I. The Kommos Region and the Houses of the Minoan Town,*. Part II: *The Minoan Hilltop and Hillside Houses*. Princeton, NJ: Princeton University Press.

Shaw, J. W. and M. Shaw. 2000. *Kommos IV: The Greek Sanctuary*. Princeton, NJ: Princeton University Press.

Shaw, J. W. and M. Shaw. 2006. *Kommos* V*: The Monumental Minoan Buildings*, Princeton, NJ: Princeton University Press.

Shaw, M. C. 1985. 'Late Minoan I Building J/T and Late Minoan III Buildings N and P at Kommos: Their Nature and Possible Uses as Residences and/or Emporia'. In *A Great Minoan Triangle in Southcentral Crete: Kommos, Hagia Triadha, Phaistos.*

Scripta Mediterranea VI (Special issue), edited by J. W. Shaw and M. C. Shaw. Toronto: Canadian Institute for Mediterranean Studies: 19–39.

Shaw, M. C. and J. W. Shaw (eds). 2012. *House X at Kommos: A Minoan Mansion Near the Sea.* Philadelphia, PA: INSTAP Academic Press.

Steffy, J. R. 1994. *Wooden Ship Building and the Interpretation of Shipwrecks*. College Station, TX: Texas A&M University Press.

Van de Moortel, A. 2006. 'Ceramic Evidence for External Contact: Protopalatial'. In *Kommos* V*: The Monumental Minoan Buildings*, edited by J. W. Shaw and M. Shaw. Princeton, NJ: Princeton University Press: 856–8.

Vasilakis, A. 2010. 'Late Minoan Shipsheds at Katsamba (Heraklion)'. In *Αρχαίολογικό Έργο Κρήτης* I, edited by M. Adrianakis and I. Tzachili. Rethymno: Faculty of Letters Publications, University of Crete: 285–93.

Watrous, L. V. 2012. 'The Harbour Complex of the Minoan Town at Gournia'. *American Journal of Archaeology* 116.3: 521–41.

Part III

11

Processes and Patterns at the Macro-Scale

Crete and Beyond

Quentin Letesson and Carl Knappett

Zooming out, we first reach the various regions that compose Crete (e.g. west Crete, Mesara, north-central Crete, Malia-Lasithi zone, Mirabello Bay area, east Crete) and then the whole island itself. This is the macro-scale where settlement patterns can be observed and 'which may see low-level exchange, competition, close affiliations; a whole range of potential scenarios, including "states"' (Knappett 2012: 395). Further out, we might speak of the global scale, that of the supra-regional, with connections beyond the island to the Cyclades, Asia Minor, the Greek mainland, and so on.

Although we have a general idea of how settlement patterns evolved during the Cretan Bronze Age (Driessen 2001; see also Bevan 2010 for an up-to-date synthesis), limitations at the micro- and meso-scale clearly also constrain our understanding of the macro-scale. Nevertheless, starting with Sir Arthur Evans (1928: 60–92), who was particularly interested in roads and how they connected specific settlements both in central and east Crete to support his view of Knossian overarching power (see also Warren 1994: 189, n.3), an interest in broader regional dynamics and top-down approaches to socio-political complexity was always prominent in Aegean archaeology (Cherry 1984; Renfrew 1972; Renfrew and Cherry 1986). This focus on site hierarchies has motivated a broad range of studies, from comparative material culture analysis (e.g. Knappett 1999) to surface surveys and associated tests which provided invaluable information on road networks (e.g. Müller 1991; Tzedakis et al. 1989; Tzedakis et al. 1990) and settlement distribution (for extensive bibliography and synthesis, see Driessen 2001; Whitelaw 2012). Although recent surveys clearly increase the temporal and spatial resolution of our data sets (e.g. Haggis 2005; Watrous 2012; Whitelaw, Bredaki, and Vasilakis

2006–7), they still have considerable gaps. For example, compared to central and east Crete, relatively few sites have been identified in the west of the island. This problem was recently tackled by Bevan and Wilson (2013), who devised a model for exploring settlement locations, hierarchies, and interconnections despite our incomplete dataset (see also chapters 12 and 15). In short, they inferred the potential location of missing sites on the basis of recurring properties of existing settlements, most notably in terms of their interconnections and access to flatter, more agriculturally favourable land. Through modelling experiments, they were then able to highlight important consistencies in Minoan settlement patterns in close correlation with the issue of human movement flowing between sites. This clearly also raises the question of the global scale: Minoan settlement patterns were indeed nested in the wider sphere of Aegean/East Mediterranean interactions (Knappett, Evans, and Rivers 2008; Knappett, Rivers, and Evans 2011). Of course, similar problems of partial data apply at that scale but, as discussed by both Fitzsimons and Gorogianni (chapter 14) and Hitchcock and Maeir (chapter 13) in this third part, it is also our interpretive models for assessing cultural diffusion that need to be critically examined.

It is clear that systematic data collection and analyses at the micro- and meso-scale of buildings and urban contexts are needed to refine our macro-scale considerations on patterns of growth, change, and distribution of settlements and assessment of their relations. Nevertheless, as for other scales, diachronic and comparative approaches have already produced significant results (Driessen 2001; Whitelaw 2012). Comparisons between settlements in the same region during different periods indeed have the potential to trace the development of settlement patterns and site hierarchies; comparisons between settlements across regions can also highlight variations and similarities, Driessen's (2001) 'divergent trajectories'. Among these regularities, there is a tendency for site sizes (in terms of population) to follow a rather strict statistical law within a given territory, resulting in a pyramidal pattern with many smaller sites at the base and progressively fewer and bigger sites towards the top (Pumain 2003; Zipf 1949). It follows that a vast majority of the sub-components forming Minoan settlement hierarchies are certainly sites of much more modest sizes than any palatial centres, which is precisely what our data sets seem to indicate. Of course, observing the existence of such a hierarchy, or rank-size distribution, is not the same as explaining it. As one of us has argued elsewhere, to tackle such issues we need to focus on all the different organizational levels, from households and villages to towns, cities, and states, and to trace their particular dynamics through time (Knappett 2009: 15). Throughout the Bronze Age divergent strategies might have been enacted with radically different local and/or regional outputs in terms of settlement patterns (Cunningham 2001; Driessen 2001). In parallel with investigations concerning the major agglomerations and palatial settlements, detailed analyses of their hinterlands is hence particularly relevant. Whitelaw (2012: 160), for example, convincingly argued that during the late Prepalatial period urban and rural processes were linked, with population expanding concomitantly in both centres and countryside, and that nucleation was certainly not the only factor triggering the noticeable development of some settlements. What is also crucial though is to refrain from projecting 'a reading of later outcomes upon earlier periods that are less well defined and understood' (Schoep and Tomkins 2012: 12). For that reason, approaches that are unveiling the dynamics and specificities of early formative periods are particularly important (see chapter 12; but also contributions in Schoep et al. 2012; Legarra Herrero 2009, 2016). Methodologically speaking, innovative analytical models and network analyses, particularly well-suited to explore such issues of developmental dynamics, are increasingly used in Minoan archaeology. These have been harnessed to test the robustness of particular networks between sites under different circumstances in a cost/benefit model of interactions at the global scale of the Aegean (Knappett, Evans, and Rivers 2008; Knappett, Rivers, and Evans 2011); as mentioned above, they were also mobilized to model settlement patterns and simulate interactions between them (Bevan 2010; Bevan and Wilson 2013).

The ability to trace, at least hypothetically, the movement of people, goods, and ideas at different scales opens up new avenues for addressing a series of important research questions, fuelling debates on the distribution of Minoan material culture on Crete and in the wider East Mediterranean region (see chapters 13 and 14) and informing analyses on the appearance of invention and the diffusion of technical innovations. For example, Devolder (2014) discussed the high level of skills required to produce ashlar masonry. Noting the wide distribution of this building technique and the demanding learning procedure associated with the acquisition of such an expertise and technical know-how, she postulated the existence of itinerant masons (see also Driessen 1989–90; Shaw 2009), travelling specialists that might have contributed to the diffusion of ashlar masonry and other related techniques (orthostate, use of timber, etc.) throughout the island, and possibly beyond (see also chapter 13). In parallel, internal or external contacts, trade routes, and exchange networks can also be studied. More generally, such a dynamic approach to settlement patterns and, by extension, to the progressive urbanization of Crete has already helped address important issues related to political geography and the emergence of the state (Bevan 2010; Bevan and Wilson 2013; Whitelaw 2012).

In this third part of the volume, Paliou and Bevan (chapter 12) first review computational approaches that can now be used to address settlement form, function, location, and spatial configuration, with a particular focus on our understanding of Bronze Age Crete. They also present analytical methods that can jointly model the factors affecting settlement location, growth, and decline in settlement hierarchies, or spatial interactions between human communities. Through their study of the evolution of such regional settlement hierarchies in south-central Crete at the period just before the emergence of the palace of Phaistos, they also highlight how we can now choose to be either more or less explicit when it comes to the realism with which we endow such models, with respect for example to topographically sensitive route networks, geographically plausible settlement hinterlands, colonization and abandonment dynamics, or human decision-making processes. In chapter 13, Hitchcock and Maeir focus on Late Minoan IIIC agglomerations and architecture, too often overlooked in Minoan archaeology. To contextualize this particular built environment they discuss the evolution of construction techniques, architectural forms, and settlement patterns after the collapse of the palatial power in LM IIIA2. Bridging the meso- and macro-/global-scale and offering a larger level of contextualization, they then go on to explore built environments in other Aegean and Aegean-style-producing cultures including those of mainland Greece, Cyprus, and Philistia, which provide a larger corpus of data to draw upon. Through this wide-ranging comparative approach, they document how cross-cultural insights on spatial patterning, architectural design, urban spatial layout, and construction details can help us to address the existence of commonalities and variations across the East Mediterranean and how this perspective can shed light on a series of processes (e.g. social unrest and breakdown, cultural mixing, etc.) that seem to characterize the end of the Bronze Age in that region. Also at the global scale, Fitzsimons (chapter 14), resolutely advocating a need to go beyond the pure colonization paradigm, sets out to elucidate the significance of the adoption and adaptation of Minoan-style architectural motifs at Ayia Irini, Kea. Rather than focusing on the ultimate origin of 'imported' architectural elements, he discusses how such adoption/adaptation processes are better considered in relation to local physical (i.e. visual impact, circulation patterns), economic (i.e. levels of labour investment), and socio-political (i.e. introduction of new and/or modified behavioural patterns) landscapes. Fitzsimons also argues that local communities on the Aegean islands were fundamentally active, engaged in a variety of competing and cooperative relationships rather than merely recipients of a spreading Minoan material culture.

Although a bottom-up inductive approach at the intra-site level is of crucial importance, ultimately the progression between scales does not have to be a strictly linear one. Actually, in urban studies, the imbrication of different scales (e.g. building > block > neighbourhood > district > city > region > country > etc.) and their dynamics is often analysed in an iterative process, the observations made at a particular scale triggering questions that need to be addressed and put in perspective in both higher and lower scales. In other words, as suggested by Knappett (2009, 2012), approaching Minoan architecture, urbanism, and urbanization—but also the trajectories of social complexity—requires thinking across multiple scales and articulating these scales explicitly. This clearly is the leitmotif of this volume and, with this third section, processes and patterns at the macro-scale are presented as intrinsically connected to various elements at the other scales. Reciprocally, the first two sections illustrated similar scalar imbrications. Of course 'an explicit acknowledgement of articulation across scales should not lead us to assume that changes across scales need be coeval and co-dependent' (Knappett 2012: 396). Furthermore, especially in comparative approaches, there is always the issue of equifinality, the fact that similar urban forms and settlement patterns can be dynamically produced by a wide variety of forces and processes (Smith 2007: 40). Systematic analyses of stability and change in architectural configuration, urban layout, and settlement patterns can thus clearly contribute to documenting the interplays between top-down and bottom-up dynamics. Articulating these different scales of the built environment has the potential to refine our understanding of the coexistence of hierarchical and heterarchical processes—the 'decision-making of elites' and the 'communal agency of commoners' (Marcus and Sabloff 2008: 9–10)—that are now understood as co-implicated in shaping Bronze Age Cretan society across different levels of socio-political organization: households, corporate groups, communities, and polities (Schoep and Knappett 2004; Knappett 2009; Schoep and Tomkins 2012).

REFERENCES

Bevan, A. 2010. 'Political Geography and Palatial Crete'. *Journal of Mediterranean Archaeology*, 23.1: 27–54.

Bevan, A. and A. Wilson. 2013. 'Models of Settlement Hierarchy Based on Partial Evidence'. *Journal of Archaeological Science* 40.5: 2415–27.

Cherry, J. 1984. 'The Emergence of the State in the Prehistoric Aegean'. *Proceedings of the Cambridge Philological Society* 30: 18–48.

Cunningham, T. 2001. 'Variations on a Theme: Divergence in Settlement Patterns and Spatial Organization in the Far East of Crete during the Proto- and Neopalatial Periods'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 72–86.

Devolder, M. 2014. *Construire en Crète minoenne: Une approche énergétique de l'architecture néopalatiale*. Leuven: Peeters.

Driessen, J. 1989–90. 'The Proliferation of Minoan Palatial Architectural Style (I) Crete'. *Acta Archaeologica Lovaniensia* 28–9: 3–23.

Driessen, J. 2001. 'History and Hierarchy: Preliminary Observations on the Settlement Pattern in Minoan Crete'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 51–71.

Evans, A. 1928. *The Palace of Minos at Knossos II*. London: Macmillan.

Haggis, D. 2005. *Kavousi I: The Archaeological Survey of the Kavousi Region*. Philadelphia, PA: INSTAP Academic Press.

Knappett, C. 1999. 'Assessing a Polity in Protopalatial Crete: The Malia-Lasithi State'. *American Journal of Archaeology* 103: 615–39.

Knappett, C. 2009. 'Scaling Up: From Household to State in Bronze Age Crete'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 14–26.

Knappett, C. 2012. 'A Regional Network Approach to Protopalatial Complexity'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 384–402.

Knappett, C., T. Evans, and R. Rivers. 2008. 'Modelling Maritime Interaction in the Aegean Bronze Age'. *Antiquity* 82.318: 1009–24.

Knappett, C., R. Rivers, and T. Evans. 2011. 'The Theran Eruption and Minoan Palatial Collapse: New Interpretations Gained from Modelling the Maritime Network'. *Antiquity* 85.329: 1008–23.

Legarra Herrero, B. 2009. 'The Minoan Fallacy: Cultural Diversity and Mortuary Behaviour on Crete at the Beginning of the Bronze Age'. *Oxford Journal of Archaeology* 29.1: 29–57.

Legarra Herrero, B. 2016. 'Primary State Formation Processes on Bronze Age Crete: A Social Approach to Change in Early Complex Societies'. *Cambridge Archaeological Journal* 26.2: 349–67.

Marcus, J. and J. A. Sabloff. 2008. 'The City's Past and Future: Introduction'. In *The Ancient City: New Perspectives on Urbanism in the Old and New World*, edited by J. Marcus and J. A. Sabloff. Santa Fe, NM: School for Advanced Research Press: 3–26.

Müller, S. 1991. 'Routes minoennes en relation avec le site de Malia'. *Bulletin de Correspondance Hellénique* 115: 545–60.

Pumain, D. 2003. 'Scaling Laws and Urban Systems'. *Sante Fe Institute Working Papers*: 2004-02-002.

Renfrew, C. 1972. *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millenium* BC. London: Methuen.

Renfrew, C. and J. Cherry (eds). 1986. *Peer-Polity Interaction and Socio-political Change*. Cambridge: Cambridge University Press.

Schoep, I. and C. Knappett. 2004. 'Dual Emergence: Evolving Heterarchy, Exploding Hierarchy'. *The Emergence of Civilization Revisited*, edited by J. C. Barrett and P. Halstead. Oxford: Oxbow Books: 21–37.

Schoep, I. and P. Tomkins. 2012. 'Back to the Beginning for the Early and Middle Bronze Age on Crete'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 1–31.

Schoep, I., P. Tomkins, and J. Driessen (eds). 2012. *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*. Oxford: Oxbow Books.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. Padua: Aldo Ausilio.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6.1: 3–47.

Tzedakis, Y., S. Chryssoulaki, Y. Venieri, and M. Argouli. 1990. 'Les Routes minoennes: le poste de Choiromandres et le contrôle des communications'. *Bulletin de Correspondance Hellénique* 114: 43–62.

Tzedakis, Y., S. Chryssoulaki, S. Voutsaki, and Y. Venieri. 1989. 'Les Routes minoennes: rapport préliminaire, défense de la circulation ou circulation de la défense?'. *Bulletin de Correspondance Hellénique* 113: 43–75.

Warren, P. 1994. 'The Minoan Roads of Knossos'. In *Knossos: A Labyrinth of History. Papers Presented in Honour of Sinclair Hood*, edited by D. Evely, H. Hughes-Brock, and N. Momigliano. Oxford: Oxbow Books: 189–210.

Watrous, L. V. 2012. *An Archaeological Survey of the Gournia Landscape: A Regional History of the Mirabello Bay, Crete, in Antiquity*. Philadelphia, PA: INSTAP Academic Press.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 114–76.

Whitelaw, T., M. Bredaki, and A. Vasilakis. 2006–7. 'The Knossos Urban Landscape Project: Investigating the Long-Term Dynamics of an Urban Landscape'. *Archaeology International* 10: 28–31.

Zipf, G. K. 1949. *Human Behaviour and the Principle of Least Effort*. Cambridge: Addison-Wesley.

12

Computational Approaches to Minoan Settlement Interaction and Growth

Eleftheria Paliou and Andrew Bevan

12.1. INTRODUCTION

Several recent approaches to Minoan urbanism have revisited the kinds of formal models and analyses first developed in fields such as urban studies or statistical physics. The goal of such applications is usually to better capture and understand the relationship between people, paths, places, and cultural interaction in terms of nodes, networks, and flows. This emphasis first appeared in Aegean Bronze Age archaeology at least thirty years ago, for example via isolated attempts to interpret built spaces using graph-based methods (Yannouli 1992). More recently, however, the idea that networks of human interaction are a key generator of urban development and social change has been progressively gaining ground in Minoan studies for several different spatial scales of analysis (see also Hacıgüzeller and Thaler 2014; Letesson 2009, 2014). At the macro-scale (many settlements in a landscape or multiple Aegean islands for instance), various forms of 'spatial interaction model' have been used to explore settlement evolution, population movement, the transmission of cultural traits, socio-political organization, and interregional trade (Bevan and Crema 2014; Bevan and Wilson 2013; Knappett, Evans, and Rivers 2008; Knappett, Rivers, and Evans 2011; Paliou and Bevan 2016). Central to these works have also been concerns about how best to identify and model environmental and spatial factors influencing past human interactions and settlement attractiveness and how to make effective use of material culture evidence in the model-building process. In this chapter, we reflect on this trend and draw upon previous experience in applying simulations of settlement interaction in the Cretan landscape to revisit some of these issues. In particular, we describe briefly computational models that aim to explore the emergence of place and path hierarchies at the island level, examine the links between cultural transmission and geographic distance, and look into the benefits of combining settlement and artefact data to approach aspects of socio-political organization.

12.2. URBANISM AND TERRITORIALITY IN CRETAN STUDIES

The growth, decline, and interaction of Bronze Age Cretan settlements have long been part of wider discussions about socio-political organization in the second millennium BC, not least with regard to different notions of Minoan palatial territoriality and political geography. Major urban sites at Knossos, Phaistos, and Malia have typically been identified as also being major political, economic, and religious centres controlling wider hinterlands (Bevan 2010; Cherry 1984, 1986; Renfrew 1972, 1986; Schoep 2001; Whitelaw forthcoming; see also chapter 7), even if there has been (a) debate about the relative degree of state centralization and influence over associated territories (Adams 2006; Knappett 1999; Schoep 1999), (b) exploration of alternative heterarchical socio-political models (Driessen, Schoep, and Laffineur 2002; Hamilakis 2002; Schoep 2002, 2006; Schoep and Knappett 2004) and (c) evidence for diverse, local trajectories of social development and urbanization in different parts of Bronze Age Crete (Legarra Herrero 2009, 2012; Schoep and Tomkins 2012: 5–7; Whitelaw 2004; 2012: 115). So while there remains an interesting range of opinion about the nature and dating of different stages of urban and socio-political development on prehistoric Crete, few would disagree that changing human interactions and settlement structures are a central issue. Nonetheless, as with most other settlement-based archaeological studies worldwide, the situation is bedevilled by incompletely recorded settlement patterns and a lack of consistent published evidence on population sizes or even site extents. Computational simulations of settlement interaction have a distinct contribution to make in this respect, as they can allow for certain types of data uncertainty, offering insights into settlement evolution and the emergence of urban centres even in the presence of incomplete datasets (Bevan and Wilson 2013; Paliou and Bevan 2016). Below we aim to point to some interesting applications of computational spatial models of settlement interaction that have received considerable attention in archaeology both many decades ago and more recently (see also Davies et al. 2014; Palmisano and Altaweel 2015; Rihll and Wilson 1987, 1991; Rivers, Knappett, and Evans 2013; Rivers and Evans 2014; Wilson 2012a).

12.3. PLACE HIERARCHIES AND PATH HIERARCHIES

As an example, we can briefly consider the simulation explored by Bevan and Wilson (2013) which comes out of a broadly 'entropy maximizing', Boltzmann–Lotka–Volterra tradition (Rihll and Wilson 1987, 1991; Wilson 2008, 2012a, 2012b, see also Technical Note). Figure 12.1, for instance, depicts a set of sites across Crete which began life as entities of equal importance but which grow or decline as a result of feedback from their relative spatial configuration (the matrix of distances separating them). In each iteration, it models a full 'flow' matrix among all pairs of sites (that estimates the amount of interaction between those two sites relative to all interactions across the study area) and updates the relative attractiveness and/or size of each site accordingly, until either the overall model results stabilize or a certain number of time-steps is reached. Such a model has several advantages, such as not necessarily requiring that we know about site sizes beforehand (although we can choose, or choose not, to constrain the results if we already know some archaeologically observed sizes). It is parametrized in two main ways: via cost of interaction that increases with distance (traditionally referred to as the model's β parameter) and the relative importance ascribed to advantages accruing from concentrated resources (traditionally referred to as the model's α parameter, see Technical Note). In Figure 12.1a, settlement sizes are shown as graduated open circles, while the very largest 'terminal' settlements are shown as the largest, white circles (whose own inflow total is larger than that of any single site receiving flow from them). We can think of territorial hierarchies of dependent sites by drawing the links (black lines) between non-terminal settlements and their maximum creditor and/or by tessellating the study area into those sub-regions occupied by a terminal and its dependents (white outlines). There are of course other ways to think about such dependencies but this one has usefully simple rules.

Despite its minimal requirements, the above broad Wilson-type model traditionally still relies on near complete knowledge of the spatial distribution of settlement (or, in the urban geographic applications, central places such as retail outlets). In most archaeological cases, our knowledge about the presence or absence of past human settlement is far from complete, and Minoan Crete is no different despite an unusually high level of attention devoted to it over more than a century. For example, the main settlements we know about are those shown in Figure 12.1b. Figure 12.1 has been computed as a model using both these known large-to-medium sized settlements plus some hypothesized ones, placed semi-randomly in similar environmental location to known ones (e.g. close to flat land with the best agricultural potential in all periods of the island's history, below an approximate tree-line on Crete, and not too close to

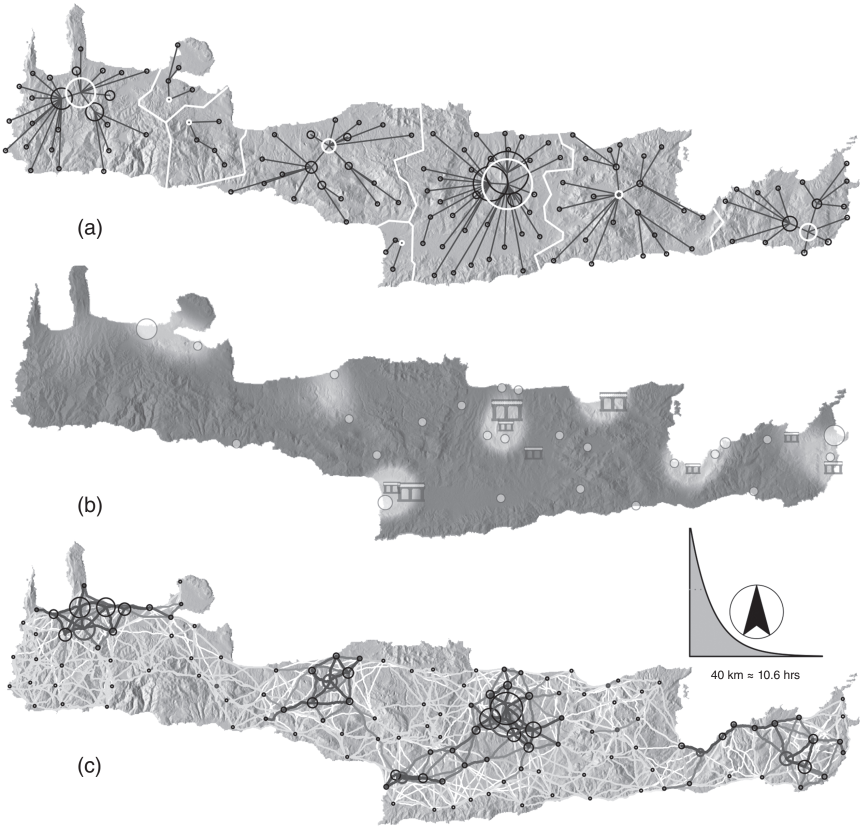

Fig. 12.1. Examples of different kinds of results from Cretan spatial interactions models: (a) an ordinary spatial interaction model of Wilson type (Euclidean distances, α=1.05, β=0.15, settlement sizes as graduated open circles, terminal settlements in white; each non-terminal settlement has been given a link to its maximum creditor, and an impression of the territories around central places shown in white outline) but which uses a mix of known Bronze Age settlements and some additional sites predicted via regression modelling on the basis of the correlation of known sites to environmental variables as flat land; (b) a kernel density summarizing the predicted location of terminal for the same model over 100 randomized sets of predicted sites; (c) an example in which both settlement sizes and path weights are both free to vary for 500 iterations (see Bevan and Wilson 2013 for further details).

one another). We also make the potentially major assumption that we can ignore the impact of very small hamlets and farms in the Minoan landscape (of which there were seemingly very many, e.g. Bevan 2002). The advantages of such guesswork only make themselves felt if we run the simulation model multiple times, with the same known sites but a different set of hypothetical sites added for each run. Then, instead of a single result such as Figure 12.1a, we can summarize multiple runs. For example, the lightest grey-coloured areas in Figure 12.1b are places where large, 'terminal' centres repeatedly are found across many different runs, indicating that these locations are common places for more important centres, given the shape of the Cretan landscape and the partial information we have about where Bronze Age sites were located. Note that these predictions do a reasonable job of identifying the same general locales where palatial sites are observed archaeologically, and also suggest one or two additional locations for which we do not as yet have firm evidence but might also expect such higher-status, palatial sites (see Bevan and Wilson 2013 for more details).

Besides simulating the movement of people, goods, and ideas among settlements in terms of flows, previous works in Minoan studies have also sought to model various aspects of human communication in the Cretan landscape by estimating travel times, visual links, and physical routes between sites, as well as territorial allocations (Bevan 2010; Déderix 2015, 2016; Fernandes et al. 2011; Siart, Eitel, and Panagiotopoulos 2008). Figure 12.1c therefore builds on this prior emphasis by depicting not simply the hierarchy of central places as in Figure 12.1a but also the hierarchical set of physical paths that might consolidate among them if the actual terrain is taken into account. The observed strengths of interaction were derived in this case by (a) the allocation of modelled flow to each of the different path segments in a path network, (b) the sharing of flow between any two sites not only according to the 'least cost' or 'optimal' path between them, but several plausible paths (known as a k-shortest path solution; for the importance of route redundancy, see also Tero, Kobayashi, and Nakagaki 2007; Tero et al. 2010), and finally (c) the iteration of the model in the same way for both paths and places, so hierarchical solutions emerge for both. Figure 12.1c is an example after some 500 iterations.

The above modelling has already grown in complexity and involves multiple simulations of uncertain data, at least two main parameters, and a modelled physical path network through Crete's rugged landscape. Any further computational complexity is probably hard to justify, but we examine one additional case here as a way to fix ideas. What happens if, instead of modelling what we suppose to be the 'best' pathways through the landscape (for a thoughtful human pedestrian), we explore the likelihood of emerging path and place hierarchies merely by considering very minimally constrained random walks between sites? Electrical circuit theory provides a nice approach and allows us to think of a raster landscape model (i.e. digital terrain) as a series of resistors across which the flow of hypothetical electric current might take multiple (unintentional) paths from one or more sources (sites) to one or more grounds (other sites, see McRae and Beier 2007). Figure 12.2a demonstrates this difference in approach by superimposing three different ways of thinking about spatial interaction between two points (a) a straight-line

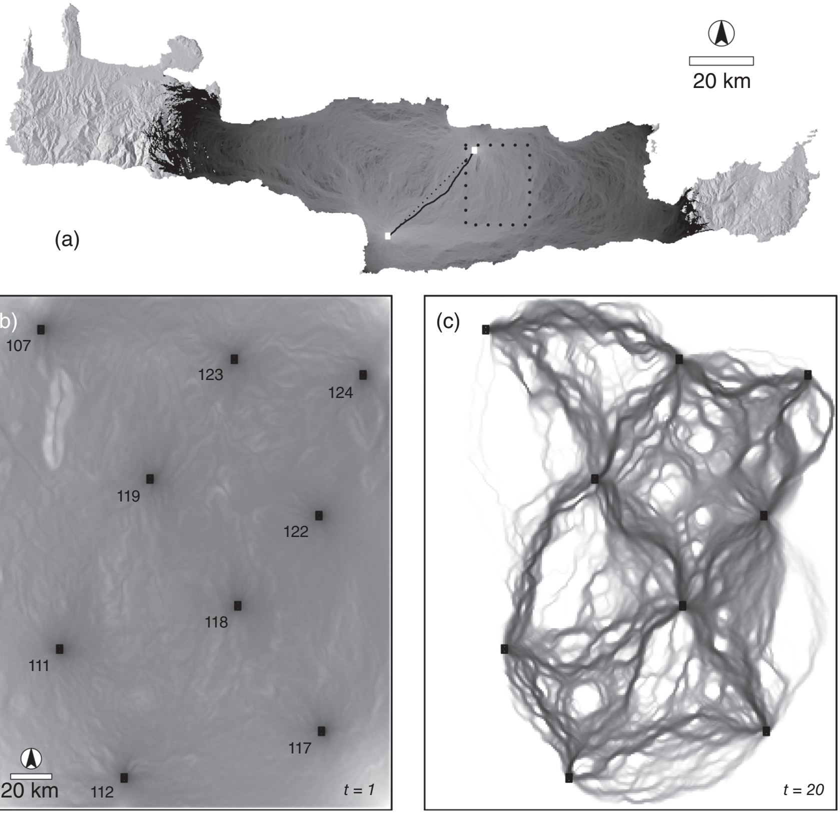

Fig. 12.2. Evolving paths and in a topographically rugged landscape: (a) the contrast between a straight-line (Euclidean) link between two sites on Crete (dotted), a least cost path (solid black line) and a map of current flow between the same two points; (b) for a sub-region of Crete (shown dashed above), a local current map between hypothetical sites; (c) the same map after allowing areas of high current to feed back as enhanced conductance over twenty time-steps.

Euclidean link (as-the-crow-flies dotted line), (b) a modelled shortest pedestrian path (i.e. terrain sensitive, but offering a single solution assumed to be the 'optimal' one), or (c) a current map of higher or lower probability of electrical flow, with our only assumption being that flatter slopes offer greater conductance (or lower resistance) whilst steeper ones offer less (or higher resistance). Clearly, a straight line affords analytical and computational simplicity, while a shortest ('least cost') path implies a certain degree of knowledge and goal-oriented behaviour; it is no accident that circuit theory approaches have been favoured in subject areas such as ecology or population genetics where either multiple conflicting agents and goals are involved and/or great time depths and time-averaging of interactions. Figures 12.2b and 12.2c go further and iterate the idea of a current map for a sub-region of Crete (see Technical Note), with Figure 12.2b showing in the first iteration (i.e. a propensity for interaction across much of the landscape and only minimal bundling of routes), while Figure 12.2c shows what might happen after twenty iterations if we let the current flows from one iteration feed back to encourage greater flow in the next. Although this toy example offers us no additional insight about Minoan urbanism in its present form, it does demonstrate very clearly how bundling of pathways can be modelled to emerge from a continuous raster terrain and no more than constrained random walks, just as it can via a vector network of shortest paths.

12.4. CULTURAL SIMILARITY AND DISTANCE

But to what extent does the use of physically grounded routes make a difference in simulations of spatial interaction of the type discussed here? We can consider this question briefly via a linguistic atlas in which local variants of 172 different words or expressions were recorded at 163 different Cretan villages in 1968–70 (Kontosopoulos 2006). Based on these local variations in pronunciation and/or vocabulary, there are several ways to measure linguistic similarity across all pairs of sampled villages (i.e. to generate a language distance matrix) and consider the fall-off in this similarity as the distances between villages increases. Linguistic distances were constructed as a similarity matrix by considering each word or expression type in turn and assigning a 1 where the two villages share the same variant(s) and 0 where they shared no variant(s). In cases where several variants were present in one or both villages, a fractional value was calculated. Final pairwise similarities then express the average similarity between each pair of sample communities for all words/expressions.

A well-known starting assumption is that, while the geographical pattern of local dialects is certainly a historical product of language evolution through time, it also strongly reflects the intensity of contemporary socio-economic activity among village inhabitants (Bevan and Crema 2014; see also Séguy 1971 for the original suggestion of such dialectical fall-off with distance, and Nerbonne 2010: 3824–6 for a comparative review). Figures 12.3b and 12.3c show bivariate plots of this relationship for straight-line, Euclidean distances, and a network of shortest paths, respectively. In both cases, there is a strong non-linear correlation that can be modelled satisfactorily via the same kind of exponential fall-off equation used in the Wilson-type interaction models introduced above. Not only does this give us an excellent starting point for thinking about the kinds of β parameter values that might be appropriate for modelling settlement growth on Crete, but they also allow us to evaluate the relative merits of these two different kinds of distance measure: interestingly there is little difference, with the straight line distances providing, if anything, a fractionally better goodness-of-fit. Put simply, therefore, and for this

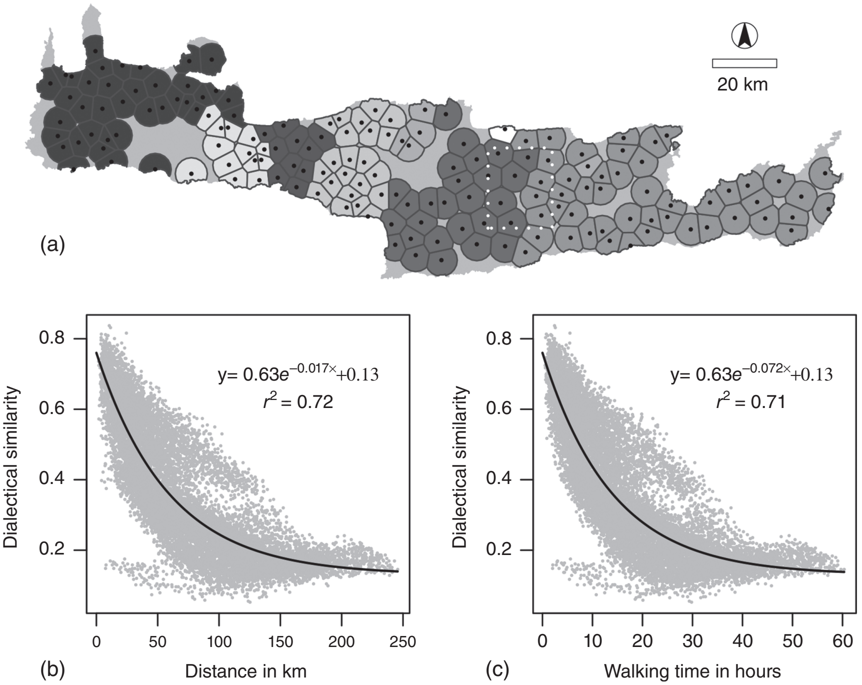

Fig. 12.3. Geographical patterning in mid-twentieth-century Cretan dialects: (a) sample communities and their clustering based on aggregate dialectal similarity. The tessellation visualizes an example of one hierarchical clustering solution (with an eight-cluster cut-off and defined via the complete linkage method). The dotted rectangle depicts a sub-region that is used as a smaller case study in other sections of this paper. Fall-off curves in Cretan dialectical similarity with (b) Euclidean distance, and (c) estimated walking time along least cost paths (each grey data-point represents a pair of censused communities).

particular example only at this stage, if we cannot be sure that more complex but geographically realistic measures of interaction offer greater explanatory power then there may be no reason to use them at all, or at the very least such complexity must be justified in other ways (e.g. as providing insight into the grounded character of flows across the intervening landscape).

12.5. COMBINING ARTEFACT AND SETTLEMENT DATA

Notwithstanding the fact that the transmission of cultural traits, as suggested by artefact distributions, has often been used to support theories about territorial allocations and the political and ideological influence of regional centres upon their hinterland (Knappett 1999), to date such archaeological evidence has rarely been discussed with respect to simulations of spatial interaction (for a small experiment, see Bevan and Crema 2014). A regional case study from south-central Crete offers an example of how material culture artefacts could be used to calibrate and validate such models (Paliou and Bevan 2016). In the past the distribution of Minoan seals in this region has been used to support theories on socio-political organization at the time of the emergence of the first palace of Phaistos (MM IB). In particularly, Sbonias identified only two localities associated with the production of elaborate seals dated to the late MM IA and probably MM IB period, at Platanos and Moni Odigitria, which he sees as dwelling places of elite groups with substantial ideological power in the Mesara valley and west Asterousia region respectively (Sbonias 1995, 2012). In addition, a formal analysis of the seal assemblages from this and the immediately preceding period (EM III–early MM IA) using the Brainerd–Robinson (B-R) coefficient of similarity reveals a notable change in interaction patterns at the time just before the emergence of the palace (Paliou and Bevan 2016: Tables 1–4). The B-R coefficient of similarity measures the degree of homogeneity between assemblages based on the proportion of seals of distinct stylistic groups that have been found in each assemblage (cf. Paliou and Bevan 2016: Tables 1–2, equation 1). In the late MM IA to MM IB periods there are only four pairs of sites with highly similar assemblages ($\geq$ 70 per cent similarity, Table 12.2), all located within south-central Crete at an average inter-site distance of *c.* 2.5 hours (Fig. 12.4b). This image can be contrasted to the situation of the immediately preceding period (EM III–early MM IA) where a much greater number of sites with highly similar seal assemblages (e.g. fourteen pairs of sites, Table 12.1) are distributed beyond the regional scale and in an average inter-site distance of *c.* 5 hours (Fig. 12.4a). If greater similarity between assemblages is indicative of greater intensity of interactions between settlements (cf. Mills et al. 2013; Paris 2014), then the above results may suggest a downward shift in the number of longer distance interactions of these communities and/or an increase in the number—and possible significance—of local scale interactions just before the emergence of the palace of Phaistos.

If we use insights from the B-R coefficient comparison to calibrate a spatial interaction model similar to that of Figure 12.1 for the site distribution in the EM III–MM IA period (41 known sites, Fig. 12.5, cf. Paliou and Bevan 2016) using relatively large β values (0.35–0.40) which restrict interactions at the local, namely regional and sub-regional, level, three to four terminals do indeed emerge in repeated runs of the model. It is noteworthy that, although the size of these centres varies among simulation runs,[1] their location is notably consistent—precisely at Phaistos, Moni Odigitria, and also close to Platanos (Fig. 12.6a)—while a fourth terminal is predicted with less likelihood at or near the site of Hagia Eirini in eastern Mesara. On the other hand, when small

Table 12.1. B-R values for EM III–Early MM IA seal assemblages where the sample size is ≥ 7 seals (cf. Paliou and Bevan 2016, Table 1). B-R values provide a scale of similarity from 0 to 200 where 200 is perfect similarity and 0 is no similarity. Over 70% similarity (B-R value ≥ 140) is indicated in bold.

Sites	Haghia Triada	Platanos	Marathokephalo	Moni Odigitria	Kali Limenes	Archanes	Koumasa	Knossos
Haghia Triada	200	103	95	**141**	**143**	87	100	100
Platanos	103	200	**185**	**162**	**160**	**178**	128	128
Marathokephalo	95	**185**	200	**153**	**149**	**175**	126	126
Moni Odigitria	**141**	**162**	**153**	200	**172**	**145**	129	129
Kali Limenes	**143**	**160**	**149**	**172**	200	**143**	130	130
Archanes	87	**178**	**175**	**145**	**143**	200	134	**150**
Koumasa	100	128	126	129	130	134	200	**171**
Knossos	100	128	126	129	130	**150**	**171**	200

Table 12.2. B-R values for Late MM IA–MM IB seal assemblages where the sample size is ≥ 7 seals (cf. Paliou and Bevan 2016, Table 2). B-R values provide a scale of similarity from 0 to 200 where 200 is perfect similarity and 0 is no similarity. Over 70% similarity (B-R value ≥ 140) is indicated in bold.

Site	Haghia Triada	Platanos	Koumasa	Moni Odigitria	Kali Limenes	Archanes
Haghia Triada	200	**144**	124	116	**141**	113
Platanos	**144**	200	**153**	103	127	96
Koumasa	124	**153**	200	66	91	64
Moni Odigitria	116	103	66	200	**175**	75
Kali Limenes	**141**	127	91	**175**	200	88
Archanes	113	96	64	75	88	200

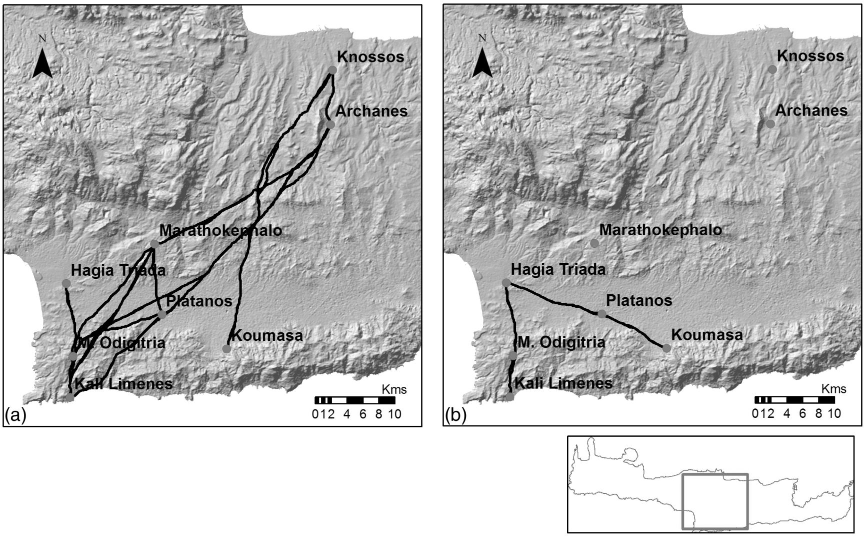

Fig. 12.4. (a) Least-cost paths between pairs of sites with >70% similarity in seal assemblages in Early Minoan III–early Middle Minoan IA; (b) least-cost paths between pairs of sites with >70% similarity in seal assemblages in late Middle Minoan IA–Middle Minoan IB. Only sites with sample size >7 seals are included in this analysis (cf. Paliou and Bevan 2016: fig. 3).

β values are used (0.15–0.20), which allow interactions beyond the regional level, the model tends to 'predict' the emergence of a single terminal in the Mesara valley, whose location, however, varies considerably among iterative model runs. Kernel densities after 100 simulations (Fig. 12.6b) are much lower than in Figure 12.6a suggesting a much less robust pattern. If there were strong evidence for the presence of a single dominant centre towards the end of MM IA we would expect a terminal to be 'predicted' at about the same location in

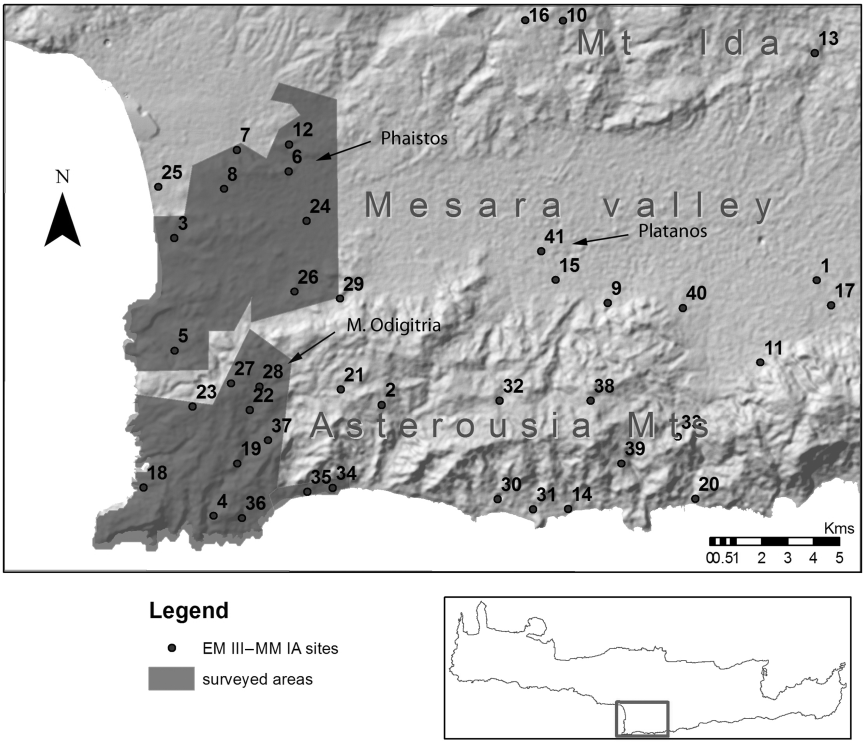

Fig. 12.5. Early Minoan III–Middle Minoan IA sites on south-central Crete: 1. Hagia Eirini, 2. Kaminospilio, 3. hamlet (Kommos Survey), 4. Hagios Antonios II (site 7), 5. Site (Kommos survey), 6. Phaistos, 7. Haghia Triada, 8. Site 76, 9. Apesokari, 10. Kalathiana, 11. Koumasa, 12. Hagios Onouphrios (sites 83 and 24), 13. Vorou, 14. Lebena III (Zervou), 15. Aspri Petra, 16. Marathokephalo, 17. Drakones, 18. Stou Skaniari to lakko, 19. Hagia Kyriaki, 20. Trypiti, 21. Skotoumenou Charakas, 22. Nio Pervoli (site 20), 23. Orthes Petres (site 27), 24. Site 98, 25. Site 110, 26. Site 93, 27. Panaplos (Site 28), 28. Moni Odigitria, 29. Kouses, 30. Lebena Yerokambos, 31. Lebena Papoura, 32. Hagios Kyrillos, 33. Christos, 34. South Coast 11, 35. South Coast 8, 36. Kali Limenes, 37. Megali Skini, 38. Korakies, 39. Krotos, 40. Porti, 41. Platanos. (For 4, 22, 23, 27 see Vasilakis 1989/1990; For 3, 5, 8, 12, 24–6 see Watrous 2004: 253–6; for 1, 2, 9–11, 13, 14, 16–19, 21, 28–41 see Goodison and Guarita 2005; for 15 see Sbonias 1995:115, 153). Cf. Paliou and Bevan 2016: fig. 1.

different simulation runs, despite the changing model input. Nonetheless, this is not the case here; thus we have to deduce a low probability of a single site being a dominant centre in south-central Crete in this period, at least given the known settlement distribution and the aforementioned modelling assumptions. The results of Figure 12.6b could be taken also to suggest competition for a central position in interaction networks between settlements situated in the area of the Mesara valley, without any single site having a major advantage in dominating the region.

If now, for comparison, we run the model multiple times using the MM IB settlement distribution (Fig. 12.7), sets of additional hypothetical sites that change before each simulation run, and the same α and β values as in figures 12.6a and 12.6b we observe always the emergence of a regional centre in west Mesara close to Phaistos (Fig. 12.8) as we move towards the end of the MM IB period. In other words, the results in this case suggest a strong probability for the existence of a dominant centre in south-central Crete in this period and remarkably different patterns from those observed at the end of MM IA (Fig. 12.6).

In conclusion, our model does not provide evidence for the presence of a single dominant centre in south-central Crete towards the end of the Prepalatial period, while it offers a rather robust pattern of three or four local centres when interactions are restricted in relatively short distances at the regional and sub-regional scale.[2] These results seem to conform with what is suggested by the distribution of elaborate seals (and also other survey and mortuary evidence: cf. Paliou and Bevan 2016); although in this case settlement data do not precisely match the dating of Prepalatial seals,[3] both sources of evidence seem to support the existence of local centres at Platanos and Moni Odigitria at the end of MM IA. On the other hand, the model suggests strongly the emergence of a regional centre in west Mesara close to Phaistos (Fig. 12.8) towards the end of MM IB period, when different spatial scales of interaction are considered.

Results from spatial interaction modelling such as those described above could be used as independent evidence in attempts to identify spheres of influence (the area delimited by white outlines, Fig. 12.1a, cf. Paliou and Bevan 2016) and important localities in interaction networks. Such evidence can prove useful in further supporting theories about socio-political organization, especially in cases where artefact analysis has to rely on looted, disturbed, or partially investigated contexts, as applies also to Prepalatial seals. That said, simulations of spatial interaction cannot determine the level of political integration on their own. For the period under study, additional evidence that could suggest a clear hierarchical political structure—such as the use of script in association with administrative documents and control over trade (cf. Schoep 2006: 47)—is lacking. Differences in settlement size in EM III–MM I may be linked to various processes of human interaction and movement other than regional integration (cf. Duffy 2015) which can also be captured by simulation models of various kinds. For example, the growth of Moni Odigitria and Phaistos in MM IA could have been linked also to small-scale aggregation phenomena, as these settlements seem to have expanded at about the same time when some of their neighbouring sites were abandoned (Branigan 2010: 267; Branigan and Vasilakis 2010: 26–7; Watrous 2004; but

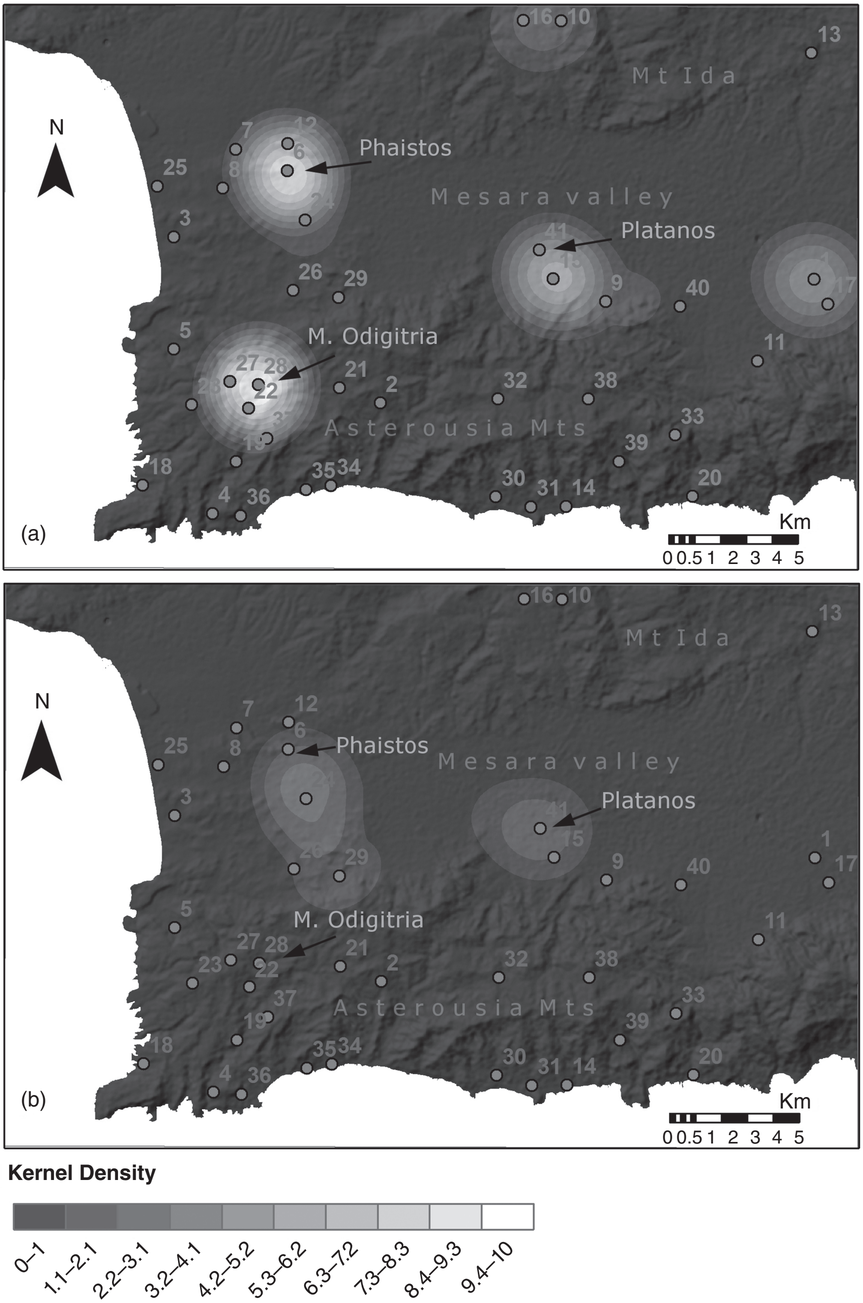

Fig. 12.6. Results after 100 simulation runs for the EM III–MM IA settlement distribution: (a) a = 1.05, b = 0.35; (b) a = 1.05, b = 0.15. For site names see Fig. 12.5. Cf. Paliou and Bevan 2016: fig. 6.

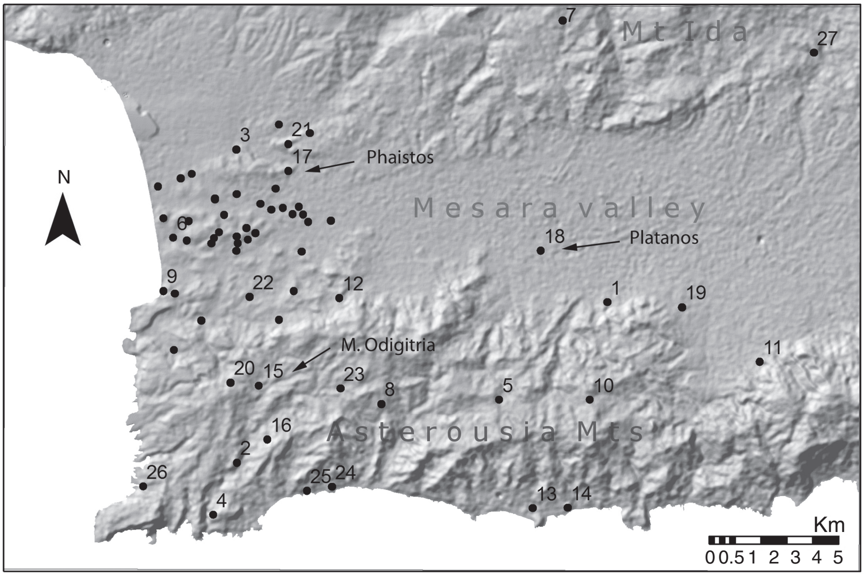

Fig. 12.7. Middle Minoan IB site distribution (excluding farms in close proximity (<1 km) to larger settlements). Sites without number are from the west Mesara and Kommos surveys (Watrous et al. 2004, p. 278: fig. 10.1). 1. Apesokari, 2. Hagia Kyriaki, 3. Haghia Triada, 4. Hagios Antonios II (site 7), 5. Hagios Kyrillos, 6. Kalamaki, 7. Kalathiana, 8. Kaminospilio, 9. Kommos, 10. Korakies, 11. Koumasa, 12. Kouses, 13. Lebena (Papoura), 14. Levina III (Zervou), 15. Moni Odigitria, 16. Megali Skini, 17. Phaistos, 18. Platanos, 19. Porti, 20. Panaplos (site 28), 21. Hagios Onouphrios (sites 83, 24, 84), 22. Sivas, 23. Skotoumenou Charakas, 24. South Coast 11, 25. South Coast 8, 26. Stou Skaniari to lakko, 27. Vorou. (For 4, 20, see Vasilakis 1989/90; for 6, 12, 21, 22 see Watrous and Hadzi-Vallianou 2004: 277–81; for 1, 2, 5,7,8, 10, 11, 13–16, 18–19, 23–7 see Goodison and Guarita 2005). Cf. Paliou and Bevan 2016: fig. 7.

see also Todaro 2012: 227 and Whitelaw 2012 for the size of Phaistos). Such phenomena in the Mesara valley could have been triggered by pressure on farmland (Watrous 2004: 267) or functional specialization, at least in the case of Phaistos, which throughout the Prepalatial period is thought to have been a regional centre for communal ceremonial activities (Todaro 2012: 228).

12.6. DISCUSSION

Over the last few decades, many studies, both in contemporary urban studies and archaeology, have suggested that population growth and evolving settlement structure reflect and trigger socio-economic developments in human societies (see above, and also Batty 2013; Bettencourt 2013; Ortman et al. 2014;

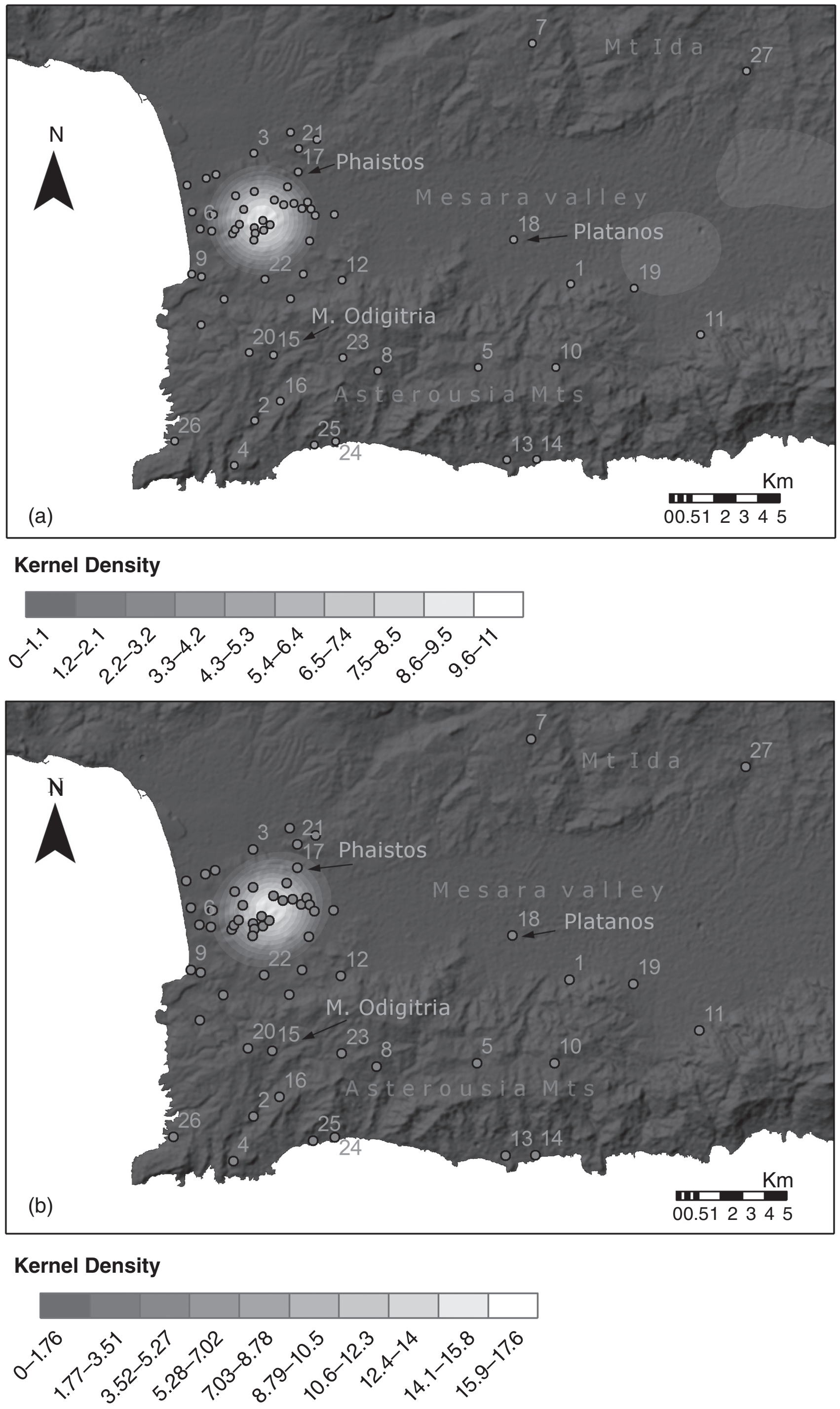

Fig. 12.8. Results after 100 simulation runs for the MM IB settlement distribution: (a) a = 1.05, b = 0.35; (b) a = 1.05, b = 0.15. Case (b) presents an unusual high density of terminals close to Phaistos because in some simulations runs two terminals were predicted in the vicinity (<3 km) of Phaistos when b = 0.15. For site names see Fig. 12.7. Cf. Paliou and Bevan 2016: fig. 8.

Ortman et al. 2015; Ortman et al. 2016). In this chapter we have presented briefly some examples of how computational models and simulations can be used to explore settlement interaction and growth in Bronze Age Crete, taking advantage of minimal data input and basic assumptions about human action and behaviour in the prehistoric landscape. Even if, on their own, such models certainly do not provide a complete picture of urban and social change in Minoan towns, they do seem to capture some essential properties of changing structure at the island and regional scale and are to a certain degree corroborated by other archaeological evidence such as known settlement sizes (at least for the major sites) or artefact distributions. Furthermore, a basic advantage of these approaches is that they do not need to ignore data uncertainty, and are well suited to examining the potentially complex feedbacks behind past settlement and path hierarchies. It is also noteworthy that models of spatial interaction similar to those presented here have been fairly successful in simulating the evolution of regional systems when applied to distinctly different cultural and temporal contexts ranging from Middle Bronze Age and Iron Age Syria to ninth- and eighth-century Greece and nineteenth-century North America (Davies et al. 2014; Palmisano and Altaweel 2015; Rihll and Wilson 1987, 1991; Wilson 2012a). These examples suggest that formal models of this kind encourage us to rethink Minoan urbanism from a comparative perspective and through the prism of interdisciplinary science.

TECHNICAL NOTE

We only offer a brief description of the basic Wilson-type spatial interaction model here as fuller details are available elsewhere (Bevan and Wilson 2013; see also Harris and Wilson 1978). However, the basic model can be represented as:

$$T_{ij} = \frac{O_i W_j^a e^{-bc_y}}{\sum_k W_k^a e^{-bc_a}} \tag{1}$$

where Tij is a matrix recording the quantity of resources—which could be goods, services, commuters or migrants, or some composite representation of these—flowing from each site i to each other site j; Oi is a measure of the size of flow originated at site i; Wj is the attractiveness or influence of site j (which for illustrative purposes can be measured by size); cij is some expression of the distance from i to j; α is a parameter used to represent the importance of attractiveness of a site—if greater than 1, representing positive returns to scale; and β is a parameter used to represent the decay of effective communication with increasing distance.

In the first instance, the W_j terms are given exogenously and the model is used to calculate (in the retail case, total revenues, in our case, 'flows' between settlements). From the T_{ij} matrix, the vector Dj can be calculated from

$$\mathrm{Dj} = \sum \mathrm{iTij} \tag{2}$$

In this case, we interpret Dj as influencing the dynamics of settlement size via an additional hypothesis:

$$\Delta \mathrm{Wj} = \epsilon(\mathrm{Dj}-\mathrm{KWj}) \tag{3}$$

K can be interpreted as a parameter that converts 'size' to 'the sum of flows' and equation (3) is thereby asserting that if the actual sum of flows exceeds this starting point, then the settlement will grow in size; and vice versa. The speed of response is controlled by the ϵ parameter.

A further elaboration of this approach is to ground flows in an actual mapped network, allowing for various forms of feedback to be modelled where, for example, high flow edges in the network further encourage flow along these links. This is the rationale behind figure 12.1c and is fully explained in Bevan and Wilson 2013. Figure 12.2b–c explores a similar idea but via a different circuit-theory inspired method that we therefore describe below. If we take a raster digital model of terrain, we can treat those cells with sites on them as both potential 'sources' from which current (e.g. interactions involving goods, people, ideas) and potential 'grounds' into which that current might flow. The intervening non-site cells in this raster landscape are, by this analogy, resistors that impede the flow of that current to varying degrees (e.g. in proportion to terrain steepness for example). Conductance is the inverse of resistance, and we use the former term to refer to all measures of local landscape connectivity, but use the latter term in the discussion of distances matrices because it allows for better comparison with Euclidean or least costs distances (for which increasing values imply decreasing interaction). A useful rule-of-thumb way to interpret a current map expressing the flows of current from A to B is in terms of the relative likelihood that a random walker would move along that particular branch of the graph given the intervening resistances (McRae and Beier 2008: 2715). For a single such map we can see a great deal of current (high certainty of travel) around the source and ground cells (i.e. the start and end settlements), as these are areas where there is obviously a very high likelihood of interactions/current passing through. In between, certain parts of the landscape constrict current along narrower paths, whilst elsewhere such flows are far less constrained. However, thought of in terms of a repeated calculation over many time-steps, there are a variety of ways in which we might feed this surface back into the calculation of the resistances/conductances themselves, and thereby explore the consolidation of particular paths. For example, if we express the flow between settlements i and j in a specific time-step as a current map across a landscape grid (4), then we can think about the way the sum of these for all pairs of settlements might feedback over multiple time-steps (t=0, 1,…, n) as follows:

$$\bar{I}_k^t = \bar{I}_k^{t-1}\left(log_\gamma\left(\sum \bar{I}_{ij}^t + 1\right) + 1\right) \tag{4}$$

The result is that high flow across a certain portion of the landscape between i and j in one time-step encourages greater flow in the following one, and a smaller or larger γ parameter encourages this feedback to occur more or less rapidly (the latter is always > 1 and, for this paper, set to the natural exponent).

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We would like to thank Quentin Letesson and Carl Knappett for inviting us to participate in the workshop on Minoan architecture and urbanism and contribute to this volume.

NOTES

1. Different model parameters—i.e. sets of additional hypothetical sites that are used to account for missing evidence especially in non-surveyed areas (Fig. 12.5)—are used before each simulation run (see also Paliou and Bevan 2016).
2. For a more detailed discussion of the results see Paliou and Bevan 2016.
3. The elaborate seals produced at Platanos and Moni Odigitria have been dated in Late MM IA and probably extend to MM IB (Sbonias 2012: 281), while the settlement data of Fig. 12.5 are dated in EM III–MM IA.

REFERENCES

Adams, E. 2006. ‘Social Strategies and Spatial Dynamics in Neopalatial Crete: An Analysis of the North-Central Area’. *American Journal of Archaeology* 110.1: 1–36.

Batty, M. 2013. *The New Science of Cities*. Cambridge, MA: MIT Press.

Bettencourt, L. 2013. ‘The Origin of Scaling in Cities’. *Science* 340.6139: 1438–41.

Bevan, A. 2002. ‘The rural landscape of Neopalatial Kythera: A GIS perspective’. *Journal of Mediterranean Archaeology* 15.2: 217–56.

Bevan, A. 2010. ‘Political Geography and Palatial Crete’. *Journal of Mediterranean Archaeology* 23.1: 27–53.

Bevan, A. and E. Crema. 2014. ‘Une modélisation géographiquement explicite d’interaction culturelle. Dialectes crétois modernes, archéologie de l’âge du Bronze’. *Les nouvelles de l’archéologie* 135: 45–50.

Bevan, A. and A. Wilson. 2013. ‘Models of Settlement Hierarchy Based on Partial Evidence’. *Journal of Archaeological Science* 40.5: 2415–27.

Branigan, K. 2010. 'The Hagiopharango in the Early Bronge Age'. In *Moni Odigitria: A Prepalatial Cemetery and Its Environs in the Asterousia, Southern Crete*, edited by A. Vasilakis and K. Branigan. Philadelphia, PA: INSTAP Academic Press: 251–69.

Branigan, K. and A. Vasilakis. 2010. 'Survey of the Environs around the Tholos cemetary'. In *Moni Odigitria: A Prepalatial Cemetery and Its Environs in the Asterousia, Southern Crete*, edited by A. Vasilakis and K. Branigan. Philadelphia, PA: INSTAP Academic Press: 3–27.

Cherry, J. F. 1984. 'The Emergence of the State in the Prehistoric Aegean'. *Proceedings of the Cambridge Philological Society* 210: 18–48.

Cherry, J. F. 1986. 'Polities and Palaces: Some Problems in Minoan State Formation'. In *Peer Polity Interaction and Sociopolitical Change*, edited by C. Renfrew and J. F. Cherry. Cambridge: Cambridge University Press: 19–45.

Davies, T., H. Fry, A. Wilson, A. Palmisano, M. Altaweel, and K. Radner. 2014. 'Application of an Entropy Maximizing and Dynamics Model for Understanding Settlement Structure: The Khabur Triangle in the Middle Bronze and Iron Ages'. *Journal of Archaeological Science* 43: 141–54.

Déderix, S. 2015. 'A matter of Scale. Assessing the Visibility of Circular Tombs in the Landscape of Bronze Age Crete'. *Journal of Archaeological Science: Reports* 4: 525–34.

Déderix, S. 2016. 'Traveling Across Archaeological Landscapes: The Contribution of Hierarchical Communication Networks'. In *Keep the Revolution Going. Proceedings of the 43rd Annual Conference on Computer Applications and Quantitative Methods in Archaeology, CAA2015*, edited by S. Campana, R. Scopigno, G. Carpentiero, and M. Cirillo. Oxford: Archaeopress: 555–65.

Driessen, J., I. Schoep, and R. Laffineur (eds). 2002. *Monuments of Minos. Rethinking the Minoan Palaces* (Aegaeum 23). Liège: Université de Liège.

Duffy, P. R. 2015. 'Site Size Hierarchy in Middle-Range Societies'. *Journal of Anthropological Archaeology* 37: 85–99.

Fernandes, R., G. Geeven, S. Soetens, and V. Klontza-Jaklova. 2011. 'Deletion/Substitution/Addition (DSA) Model Selection Algorithm Applied to the Study of Archaeological Settlement Patterning'. *Journal of Archaeological Science* 38: 2293–300.

Goodison, L. and C. Guarita. 2005. 'A New Catalogue of the Mesara-Type Tombs'. *Studi Micenei ed Egeoanatolici* 47: 171–212.

Hacıgüzeller, P. and U. Thaler. 2014. 'Three Tales of Two Cities? A Comparative Analysis of Topological, Visual and Metric Properties of Archaeological Space in Malia and Pylos'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 203–62.

Hamilakis, Y. 2002. 'Too Many Chiefs?: Factional Competition in Neopalatial Crete'. In *Monuments of Minos. Rethinking the Minoan Palaces* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 179–99.

Harris, B. and A. G. Wilson. 1978. 'Equilibrium Values and Dynamics of Attractiveness Terms in Production-Constrained Spatial-Interaction Models. *Environment and Planning A* 10.4: 371–88.

Knappett, C. 1999. 'Assessing a Polity in Protopalatial Crete: The Malia-Lasithi State'. *American Journal of Archaeology* 103.4: 615–39.

Knappett, C., T. Evans, and R. Rivers. 2008. 'Modelling Maritime Interaction in the Aegean Bronze Age'. *Antiquity* 82.318: 1009–24.

Knappett, C., R. Rivers, and T. Evans. 2011. 'The Theran Eruption and Minoan Palatial Collapse: New Interpretations Gained from Modelling the Maritime Network'. *Antiquity* 85.329: 1008–23.

Kontosopoulos, N. G. 2006. *Γλωσσικός Ατλας της Κρήτης* (Language Atlas of Crete). Heraklion: University of Crete Press.

Legarra Herrero, B. 2009. 'The Minoan Fallacy: Cultural Diversity on Crete at the Beginning of the Bronze Age as Assessed through the Mortuary Behaviour'. *Oxford Journal of Archaeology* 28: 29–57.

Legarra Herrero, B. 2012. 'Cemeteries and the Construction, Deconstruction and Non-Construction of Hierarchical Societies in Early Bronze Age Crete'. In *Back to the Beginning: Reassessing Social, Economic and Political Complexity in the Early and Middle Bronze Age on Crete*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 325–57.

Letesson, Q. 2009. *Du phénotype au génotype: analyse de la syntaxe spatiale en architecture minoenne (MMIIIB–MRIB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

McRae, B. H. and P. Beier. 2007. 'Circuit Theory Predicts Gene Flow in Plant and Animal Populations'. *Proceedings of the National Academy of Sciences of the USA* 104: 19885–90.

McRae, B. H., B. Dickson, T. Keitt, and V. Shah. 2008. 'Using Circuit Theory to Model Connectivity in Ecology, Evolution, and Conservation'. *Ecology* 89.10: 2712–24.

Mills, B. J., J. M. Roberts Jr, J. J. Clark, W. R. Haas Jr, D. Huntley, M. A. Peeples, L. Borck, S. C. Ryan, M. Trowbridge, and R. L. Breiger. 2013. 'The Dynamics of Social Networks in the Late Prehispanic U.S. Southwest'. In *Network Analysis in Archaeology: New Approaches to Regional Interaction*, edited by C. Knappett. Oxford: Oxford University Press: 181–202.

Nerbonne, J. 2010. 'Measuring the Diffusion of Linguistic Change'. *Philosophical Transactions of the Royal Society B* 365: 3821–8.

Ortman, S. G., A. H. F. Cabaniss, J. O. Sturm, and L. M. A. Bettencourt. 2014. 'The Pre-History of Urban Scaling'. *PLOS ONE* 9.2: e87902.

Ortman, S. G., A. H. F. Cabaniss, J. O. Sturm, and L. M. A. Bettencourt. 2015. 'Settlement Scaling and Increasing Returns in an Ancient Society'. *Sciences Advances* 1.1: e1400066.

Ortman, S. G., K. E. Davis, J. Lobo, M. E. Smith, L. M. A. Bettencourt, and A. Trumbo. 2016. 'Settlement Scaling and Economic Change in the Central Andes'. *Journal of Archaeological Science* 73: 94–106.

Paliou, E. and A. Bevan. 2016. 'Evolving Settlement Patterns, Spatial Interaction and the Socio-Political Organisation of Late Prepalatial South-Central Crete'. *Journal of Anthropological Archaeology* 42: 184–97.

Palmisano, A. and M. Altaweel. 2015. 'Landscapes of Interaction and Conflict in the Middle Bronze Age: From the Open Plain of the Khabur Triangle to the Mountainous Inland of Central Anatolia'. *Journal of Archaeological Science: Reports* 3: 216–36.

Paris, E. H. 2014. 'Cross-Valley Communities: Identity and Interaction in Early Postclassic Period Highland Chiapas'. *Journal of Anthropological Archaeology* 34: 78–99.

Renfrew, C. 1972. *The Emergence of Civilisation. The Cyclades and the Aegean in the Third Millenium B.C.* London: Methuen.

Renfrew, C. 1986. 'Introduction: Peer Polity Interaction and Social-Political Change'. In *Peer Polity Interaction and Socio-Political Change*, edited by C. Renfrew and J. F. Cherry. Cambridge: Cambridge University Press: 1–18.

Rihll, T. E. and A. G. Wilson. 1987. 'Spatial Interaction and Structural Models in Historical Analysis: Some Possibilities and an Example'. *Histoire et Mesure* 2: 5–32.

Rihll, T. E. and A. G. Wilson. 1991. 'Modelling Settlement Structures in Ancient Greece: New Approaches to the Polis'. In *City and Country in the Ancient World*, edited by J. Rich and A. Wallace-Hadrill. London: Routledge: 59–95.

Rivers, R., C. Knappett, and T. Evans. 2013. 'What Makes a Site Important? Centrality, Gateways, and Gravity'. In *Network Analysis in Archaeology: New Approaches to Regional Interaction*, edited by C. Knappett. Oxford: Oxford University Press: 125–50.

Rivers, R. J. and T. S. Evans. 2014. 'New Approaches to Archaic Greek Settlement Structure'. *Les nouvelles de l'archéologie* 135: 21–7.

Sbonias, K. 1995. *Frükretische Siegel: Ansätze für eine Interpretation der sozial-politischen Entwicklung auf Kreta während der Frühbronzezeit.* Oxford: Archaeopress.

Sbonias, K. 2012. 'Regional Elite-Groups and the Production and Consumption of Seals in the Prepalatial Period. A Case-Study of the Asterousia Region'. In *Back to the Beginning: Reassessing Social, Economic and Political Complexity in the Early and Middle Bronze Age on Crete*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 273–89.

Schoep, I. 1999. 'Tablets and Territories? Reconstructing Late Minoan IB Political Geography through Undeciphered Documents'. *American Journal of Archaeology* 103.4: 201–21.

Schoep, I. 2001. 'Managing the Hinterland: The Rural concerns of Urban Administration'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 87–102.

Schoep, I. 2002. 'The State of the Minoan Palaces or the Minoan Palace-State?'. In *Monuments of Minos. Rethinking the Minoan Palaces* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 15–33.

Schoep, I. 2006. 'Looking beyond the First Palaces: Elites and the Agency of Power in EM III–MM II Crete'. *American Journal of Archaeology* 110.1: 37–64.

Schoep, I. and C. Knappett. 2004. 'Dual Emergence: Evolving Heterarchy, Exploding Hierarchy'. In *The Emergence of Civilisation Revisited*, edited by J. Barrett and P. Halstead. Oxford: Oxbow Books: 21–37.

Schoep, I. and P. Tomkins. 2012. 'Back to the Beginning for the Early and Middle Bronze Age on Crete'. In *Back to the Beginning: Reassessing Social, Economic and Political Complexity in the Early and Middle Bronze Age on Crete*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 1–31.

Séguy, J. 1971. 'La relation entre la distance spatiale et la distance lexicale'. *Revue de Linguistique Romane* 35: 335–57.

Siart, C., B. Eitel, and D. Panagiotopoulos. 2008. 'Investigation of Past Archaeological Landscapes using Remote Sensing and GIS: A Multi-Method Case Study from Mount Ida, Crete'. *Journal of Archaeological Science* 35: 2918–26.

Tero, A., R. Kobayashi, and T. Nakagaki. 2007. ‘A Mathematical Model for Adaptive Transport Network in Path Finding by True Slime Mold’. *Journal of Theoretical Biology* 244: 553–64.

Tero, A., S. Takagi, T. Saigusa, K. Ito, D. Bebber, M. Fricker, K. Yumiki, R. Kobayashi, and T. Nakagaki. 2010. ‘Rules for Biologically Inspired Adaptive Network Design’. *Science* 327.5964: 439–42.

Tobler, W. 1993. ‘Three Presentations on Geographical Analysis and Modeling: Non-Isotropic Geographic Modeling; Speculations on the Geometry of Geography; Global Spatial Analysis’. *National Center for Geographic Information and Analysis Technical Report* 93.1.

Todaro, S. 2012. ‘Craft Production and Social Practices at Prepalatial Phaistos: The Background to the First “Palace”’. In *Back to the Beginning: Reassessing Social, Economic and Political Complexity in the Early and Middle Bronze Age on Crete*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 195–235.

Vasilakis, A. 1989/90. ‘Proistorikes theseis sti moni Odigitrias—Kalous Limenes’. *Kritiki Estia* 3: 11–80.

Watrous, L. V. 2004. ‘State Formation (Middle Minoan IA)’. In *The Plain of Phaistos. Cycles of Social Complexity in the Mesara Region of Crete*, edited by L. V. Watrous, D. Hadzi-Vallianou, and H. Blitzer. Los Angeles: Cotsen Institute of Archaeology: 253–76.

Watrous, L. V. and D. Hadzi-Vallianou. 2004. ‘Palatial Rule and Collapse (Middle Minoan IB–Late Minoan IIIB)’. In *The Plain of Phaistos. Cycles of Social Complexity in the Mesara Region of Crete*, edited by L. V. Watrous, D. Hadzi-Vallianou, and H. Blitzer. Los Angeles: Cotsen Institute of Archaeology: 277–304.

Watrous, L. V., D. Hadzi-Vallianou, and H. Blitzer. 2004. *The Plain of Phaistos. Cycles of Social Complexity in the Mesara Region of Crete*. Los Angeles: Cotsen Institute of Archaeology.

Whitelaw, T. 2004. ‘Alternative Pathways to Complexity in the Southern Aegean’. In *The Emergence of Civilisation Revisited*, edited by J. Barret and P. Halstead. Oxford: Oxbow Books: 232–56.

Whitelaw, T. 2012. ‘The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation’. *Back to the Beginning: Reassessing Social, Economic and Political Complexity in the Early and Middle Bronze Age on Crete*, edited by I. Schoep, P. Tomkins, and J. Driessen. Oxford: Oxbow Books: 114–76.

Whitelaw, T. Forthcoming. ‘Recognising States in Prehistoric Crete’. In *From the Foundations to the Legacy of Minoan Society. Papers in Honour of Keith Branigan*, edited by M. Relaki and Y. Papadatos. Oxford: Oxbow Books.

Wilson, A. 2008. ‘Boltzmann, Lotka and Volterra and Spatial Structural Evolution: An Integrated Methodology for Some Dynamical Systems’. *Journal of the Royal Society Interface* 5.25: 865–71.

Wilson, A. 2012a. ‘Geographical Modeling for Archaeology and History: Two Case Studies’. *Advances in Complex Systems* 15: 11500081–115000814.

Wilson, A. 2012b. *The Science of Cities and Regions: Lectures on Mathematical Model Design*. Dordrecht: Springer Netherlands.

Yannouli, E. 1992. ‘Reason in Architecture: The Component of Space. A Study of Domestic and Palatial Buildings in Bronze Age Greece’. Unpublished PhD thesis. University of Cambridge.

13

Lost in Translation

Settlement Organization in Postpalatial Crete—A View from the East

Louise A. Hitchcock and Aren M. Maeir

13.1. INTRODUCTION

This contribution will consider problems and issues related to understanding architecture and urbanism in postpalatial Crete in its larger Mediterranean context, with reference particularly to Philistia but also to Cyprus and mainland Greece (Fig. 13.1). Comparisons with Philistia and Cyprus are relevant because many scholars have argued for a migration to these regions in the form of large scale colonization, and they have attempted to identify Aegean influences and even direct architectural transfers in these regions (as outlined in sections 13.2 and 13.4). This paper takes a more moderate or minimalist position: that any migration to these regions from the Aegean was limited and entangled, taking the form of what Knapp (2008: 266–8, 289, 292, 356; see also Hitchcock and Maeir 2013) has termed a 'hybridization process'. However, a comparative approach among the Mediterranean regions has value regardless of where one positions oneself on the issue of migration, cross-cultural influence, and/or interconnections (see now Knapp and Manning 2016). The value lies in cross-cultural patterning that may be identified based on common postpalatial changes in social organization, structures, and practices; levels of technology; climate; and geography. It is the search for such patterning that typifies the approach to studying culture in cultural anthropology (e.g. Haviland et al. 2011). The benefit in identifying architectural patterns and differences across IIIC pottery-producing cultures can help to identify both common social practices and regional differences. Furthermore, we will argue that understanding architecture on multiple scales (urbanism, curation, design, and technique) in this era should emphasize IIIC commonalities,[1]

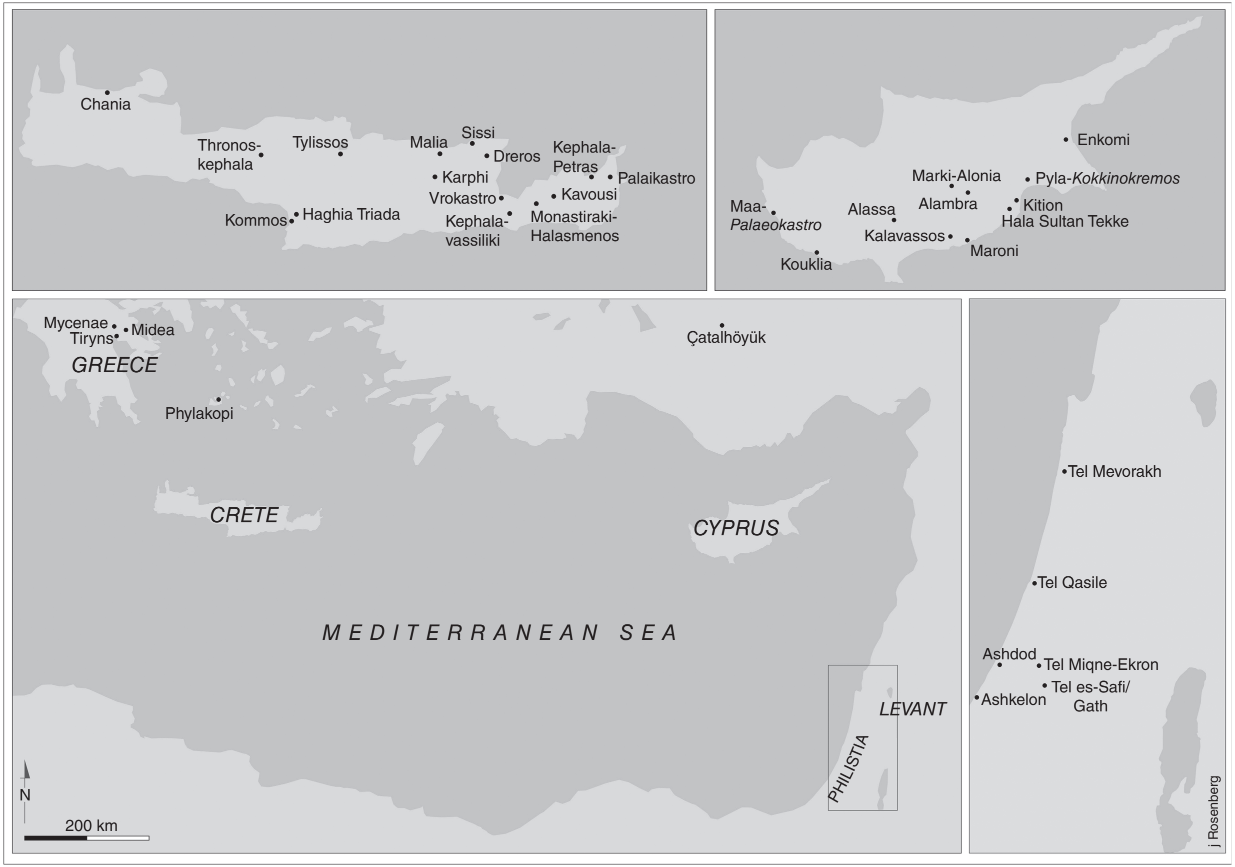
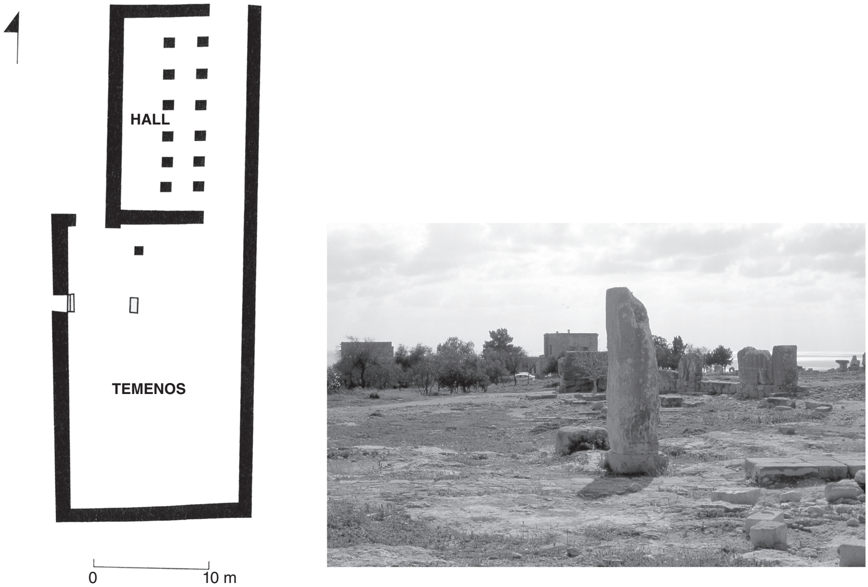


Fig. 13.1. Map of sites mentioned in the text (courtesy of Tell es-Safi/Gath Excavations, by J. Rosenberg).

rather than past studies that have privileged and over-emphasized continuities with the palatial Bronze Age. While such continuities are interesting and worth drawing attention to, emphasizing them minimizes the significance of the breakdown and diminishing of official architectural styles. In addition, given that the data base for architecture is much smaller than for ceramic studies, a comparative approach can bring new insights gained by using different methods—as in Driessen's study of complementarity in the different use of similar spaces by males and females as indicated by different types of artefact patterning in each space (see chapter 5). His approach might be usefully applied to LM IIIC settlements where there is a clear distinction in architectural forms (see section 13.2). This contribution will begin with a brief overview of previous work on Philistine architecture, then go on to compare and contrast Philistine, Cypriot, and Aegean buildings and urban landscapes with special reference to Crete, discuss the importance of regionalism, and conclude with a summary of major points and future directions.

A couple of paradoxes influence the study of the Philistines and the Sea Peoples with regard to the Aegean. As observed by Letesson and Knappett (chapter 1) and Devolder (chapter 4), similar paradoxes are also an issue in the Aegean. Ceramic and faunal evidence consistently receive detailed analysis, while architectural details are frequently glossed over, lacking Geertzian practice of 'thick description' (e.g. Silverman 1990, see also chapter 1) through the detailed documentation of construction techniques. This has been rather problematic for Cyprus and Philistia where various architectural features have been assigned an Aegean origin based on a superficial analysis of perceived similarities, or are selectively studied, or simply ignored. Another paradox is that while many scholars (e.g. Dothan and Dothan 1992) want the Philistines to have an Aegean (read, specifically Indo-European) origin, there has been a past reluctance to accept certain elements that are shared with the biblical Israelites, such as horned altars, as possibly entangled with the Aegean (e.g. Maeir, Hitchcock, and Horwitz 2013; Hitchcock 2002).

The traditional narrative around Philistine and Sea Peoples' architecture has been to make grandiose, overwrought, and inappropriate comparisons to Aegean architecture of the Late Bronze Age. Notable examples of the grandiose include Burdajewicz's (1990) attribution of the temples at Palaepaphos (Figs 13.2a, b) and Kition to Sea Peoples or Aegean migrants and the Dothan's (Dothan and Dothan 1992: 245; Dothan 1998: 156–7) and Karageorghis's (1998: esp. 277; 2002: 87–8) past and inappropriate comparisons of Philistine and Cypriot hearths to Mycenaean palatial hearths. At Enkomi, Karageorghis (1998) was most certainly influenced by Dikaios (1969: 106) whom he cites ('It is not difficult to recognise here the arrangement of the Mycenaean megaron and especially that of the palace at Pylos') with regard to Enkomi room 77 (Fig. 13.3). The pebble construction found in many Philistine hearths is largely absent in the Aegean, while a great deal of regional diversity in hearth



(a) (b)

Fig. 13.2. (a) Reconstruction of the plan of the Temple of Aphrodite at Kouklia-*Palaepaphos*, Cyprus, thirteenth century BCE (from Webb 1999: fig. 20, with permission); (b) view of the remains of the Temple of Aphrodite at Kouklia-*Palaepaphos*, Cyprus, thirteenth century BCE (photograph by L. A. Hitchcock).

construction exists in Philistia itself (Maeir and Hitchcock 2011).[2] Thus, many claims suggesting architectural similarities between IIIC cultures of the Aegean and Cyprus and the Levant lack the detailed rigour applied to the study of ceramics. In another example, Karageorghis (2000: 265–6) compared the overlapping dog-leg gate at Maa-*Palaeokastro* (Fig. 13.4) to the dog-leg entrance that supposedly preceded the Lion Gate at Mycenae, and he has used this comparison to argue for Mycenaean colonization of the site. However, this feature was not preserved at Mycenae but was reconstructed based on conjecture (Mylonas 1962: 171 fig. 102, 182). More recently, Master and Aja (2011) suggest that 'horns of consecration' provide the most promising venue for understanding Installation 539 (Fig. 13.5), an intriguing plastered and horned feature recently discovered at Ashkelon interpreted as an altar, yet they cite few of the relevant studies or site reports of horns of consecration in either Cyprus or the Aegean and assign a Greek mainland origin to it, even though few examples come from the mainland, with more examples from Crete and Cyprus.[3]

Recent excavations and studies of LM IIIA–C sites in Crete and recent analyses of LH IIIC structures on the mainland provide evidence of a new reality in the Aegean: one without palatial centres or with modified ones as at

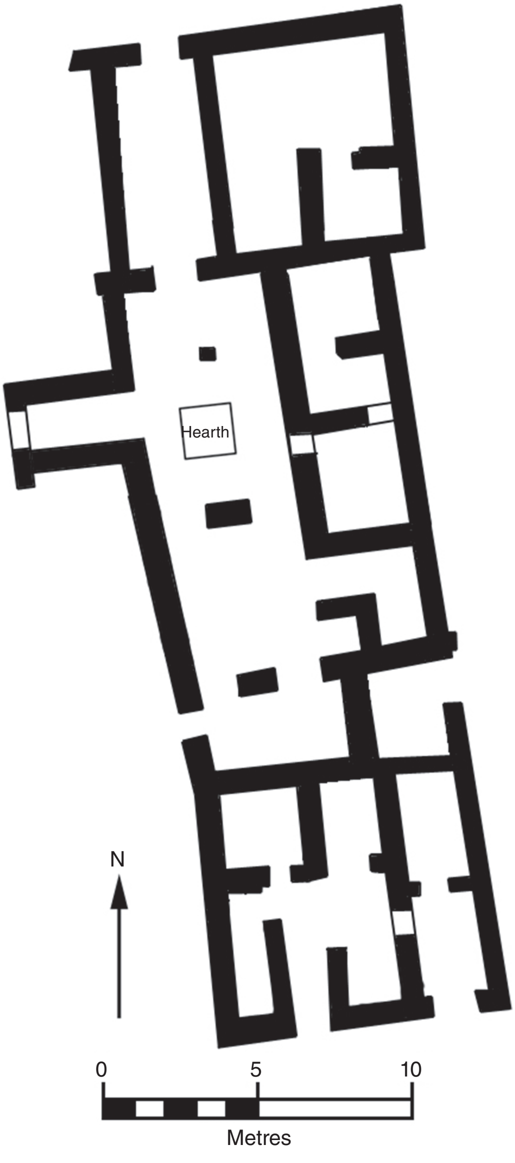


Fig. 13.3. Ashlar Building, Enkomi, thirteenth or twelfth century BCE (Hitchcock 2008a: fig. 6, illustration by B. T. O'Neill, reproduced by permission).

Tiryns and Midea, a decline in the quality of architecture (cf. Maran 2000: 121), and by IIIC, an almost complete disappearance of writing and administration. The decline of worked masonry in IIIC producing cultures in Greece and in Philistia stands in striking contrast to the palatial era with enormous ashlar blocks in common use by LM I on Crete, in LH IIIA–B Greece, and in LC IIC

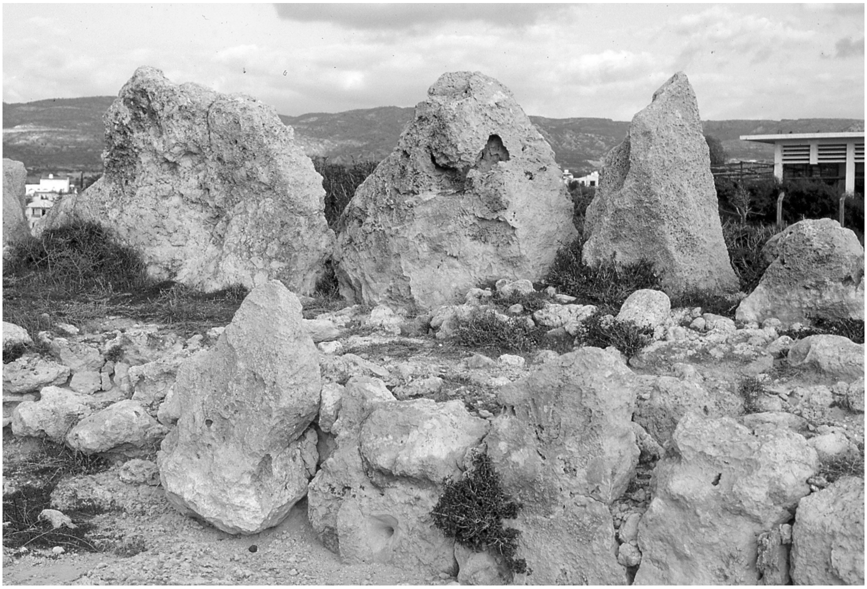


Fig. 13.4. So-called Mycenaean style dog-leg gate, Maa-*Palaeokastro*, twelfth century BCE (photograph by L. A. Hitchcock).

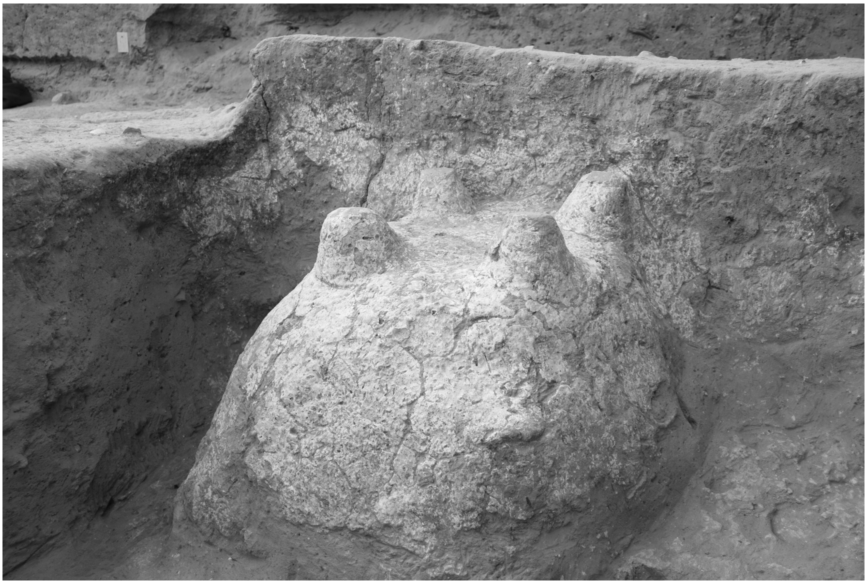


Fig. 13.5. 'Horned Altar', installation 539, at Ashkelon, twelfth century BCE (Master and Aja 2011: fig. 7, courtesy of the Leon Levy Expedition to Ashkelon).

Cyprus. Striking examples of the monumentality of these eras and places include (but are not limited to) the orthostats at Kommos (Shaw 2013), the Treasury of Atreus at Mycenae (Frizell 1997–8), and in the sophisticated use of ashlar with drafted margins in LC IIC Cyprus (Hitchcock 2008a). Further, there was the symbolic use of certain decorative stones in the Late Bronze Age Aegean, such as conglomerate in the Mycenaean world and gypsum by the Minoans (Hitchcock 2012; Hitchcock et al. 2016, with further references). The monumental architecture of the Late Bronze Age among these cultures was a medium for the expression of power and control that seems to have largely dissipated by the early Iron Age, preserved mainly in remains (Maran 2006; see also Alexander 1998: 490). These remains include column bases and occasional worked pavements (Hitchcock 2012), incorporated as spolia as at Sissi (Crete) (Gaignerot-Driessen 2011: 93–4), in strategic areas of buildings such as corners—as at Quartier Nu (Crete) (Driessen and Farnoux 1994: 60)—and at Maa-*Palaeokastro* (Cyprus) (Demas 1988: 9–14). Haghia Triada (Crete) uses an enormous amount of reused ashlar, as carefully detailed in Privitera (2015), but this seems to be the exception rather than the rule. The monumental remains of the palatial era were memorialized in ruin cult as documented by Prent (2003; 2004; 2005: 531–2, 552) at Amnissos, Knossos, and Phaistos. Though ashlar is not absent in other postpalatial Cretan sites such as Palaikastro and Tylissos (see Hayden 1981: 122), such remnants still would have been highly significant based on their rarity (e.g. Wright 1994: 61).

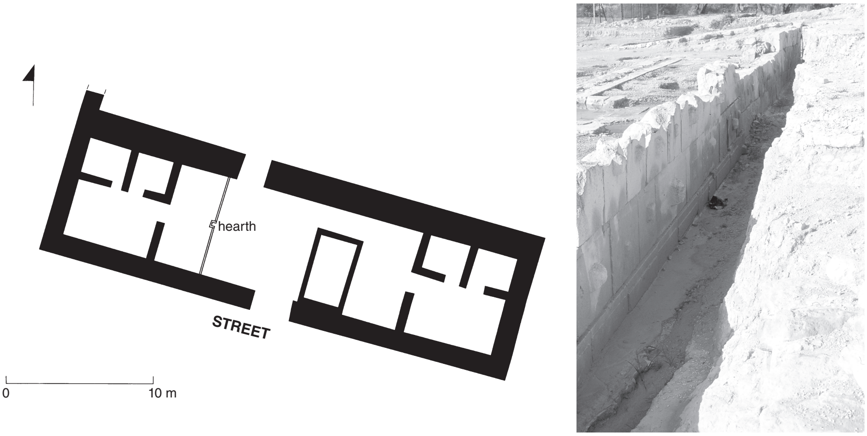
The systemic changes resulting from the collapse of the Minoan palaces and later of the Mycenaean palaces (e.g. Cline 2014) would have eliminated the ability of wealthy patrons to harness labour and resources. If builders and designers were among the Sea Peoples and other potentially migrating (or mercantile, e.g. Sherratt 1998) groups, it is tempting to suggest that skilled builders turned their energies toward ship production as ships seem to maintain remarkable continuity between the Bronze and Iron Ages (cf. Wedde 2006; also Deger-Jalkotzy 2008: 399; recently Emanuel 2014). Devolder (chapter 4) has noted that with regard to stone-cutting technology, it was necessary to begin at a young age to develop the reflexes for stone working. Jo Cutler (2016: 174–5) has made similar observations with regard to weaving technology as a long-term skill that can take several years for vertical transfer to occur, with an apprentice working alongside a parent. Motor habits are internalized through repeated actions, whereby it is more difficult to change an existing motor habit than to teach a novice. If builders transferred the motor skills used for building structures in both wood and stone to shipbuilding, we may be seeing an example of what Brysbaert (2007; also Brysbaert and Vetters 2010) terms cross-craft interaction (horizontal transfer). A perfect example of this is the ivory workshops in the Aegean where wood-working and ivory-working took place in the same workshop, using similar tools and techniques. Evely (1992), Tournavitou (1995: 126), and

Moak (2000: 76–9) discuss a wide range of possible tools used in ivory and wood carving in the Aegean Bronze Age. Tools that were used for both include the drill, small chisel, saw, compass, points, file, obsidian, and abrasives and polishers such as emery or pumice.[4]

Clearly, then, with the collapse of palatial society, there was a reorientation of the megaron as a cultural form and of urbanism in the IIIC Aegean, with a higher proportion of smaller settlements assuming very diverse urban layouts in LM IIIC, as suggested by Rupp (2014), rather than large urban centres. In addition, there was an attempt to rehabilitate the mainland palace centres as loci of communal activity through a reorientation of the megaron, while communal activity on Crete was focused primarily around simple shrines of the Goddess with Upraised Arms as at Kavousi and in open air feasting areas around pits as at Thronos-Kephala.[5] An exception is the impressive complex at Kephala-Vasiliki (Eliopoulos 1998, 2003, 2004), which was intervisible with the neighbouring site of Monastiraki-Halasmenos (also McEnroe 2010: 151). Any remaining centralized authorities in the Mediterranean may have been too weakened (e.g. Gilan 2013) to command the resources and mobilize the labour to undertake elaborate building programmes that match the grandeur of the Late Bronze Age (e.g. McEnroe 2010), although cult centres as at Enkomi, Kition, and Palaepaphos (Karageorghis and Demas 1985; Webb 1999: 58–84, 91–113) on Cyprus were an exception. The efforts of emerging elites in the postpalatial Mediterranean seem to have been more directed toward establishing genealogical links with the past through the acquisition and manipulation of surviving symbols of the Late Bronze Age or through establishing and maintaining social bonds and alliances through ritual drinking and/or feasting. Such activities have been detailed at Tiryns by Stockhammer (2009), illustrating the importance of spatial studies of the manipulation of ceramics in a highly visible architectural and spatial context. On Crete, an urban landscape of feasting pits documented at Thronos-Kephala by D'Agata (1997–2000, 2000), has made it possible to better understand a comparable urbanized landscape of rubbish deposits at Tell es-Safi, Philistine Gath (Hitchcock et al. 2015).

13.2. VALUE ADDED: COMPARING PHILISTINE, CYPRIOT, AND AEGEAN BUILDINGS

A starting point for understanding the architecture of the IIIC world is to approach it on several different scales. These include comparing and contrasting construction techniques, architectural design, the urban landscape—which is not always possible given the years needed to uncover a site, or later



(a) (b)

Fig. 13.6. (a) Plan of 'megaron' forming south wing of monumental building at Alassa-*Palaiotaverna* (from Webb 1999: fig. 52, with permission); (b) north facade of monumental building at Alassa-*Palaiotaverna* (photograph by L. A. Hitchcock).

disturbances—and regional and supra-regional differences and similarities. There are some pertinent issues with regard to regionalism. Iacovou (2008: esp. 631–2; also Knapp 2008) has noted this for Cyprus, which does not present a uniform picture in the early Iron Age: the monumental central administrative court-centred structures at Alassa (Fig. 13.6), Kalavassos, and Maroni come to an end; religious centres at Kition and Kouklia thrive; mercantile cities at Hala Sultan Tekke and Enkomi continue; and new but short-lived settlements are founded at Maa-*Palaeokastro* and Pyla-*Kokkinokremos*, abandoned a short time later. Attempts have been made to associate Maa with settlements by Aegean 'Sea Peoples' and Pyla as a settlement founded by Aegean refugees (Karageorghis 1998, 2000, 2002, 2011a).[6] However, none of the domestic structures excavated thus far at Pyla-*Kokkinokremos* (dated to the final phase of LC IIC, *c.* 1230 BCE),[7] where two Cypro-Minoan tablets were recently discovered (Kanta 2014a: 110–11), appear to bear any relation to Mycenaean or Mycenaeanizing architecture. Two of the complexes, designated A (Fig. 13.7) and B, are comparable in form and in size to McEnroe's Type 3 of Minoan House, however they clearly draw on Cypriot antecedents as found at Alambra and at Kalavassos-*Ayios Dhimitreos* (Hitchcock 2011).[8] Hitchcock and Maeir (2014: 630) have stressed the defensive nature of the urban plan at Pyla, with houses constructed next to each other to form a protective wall. This suggestion is further supported by recent excavations exposing more such architecture, the use of casemate construction, and marshy surrounds suggesting the presence of rivers and torrents (Kanta 2014b: esp. 113). Architecturally, the situation at Maa-*Palaeokastro* suggests

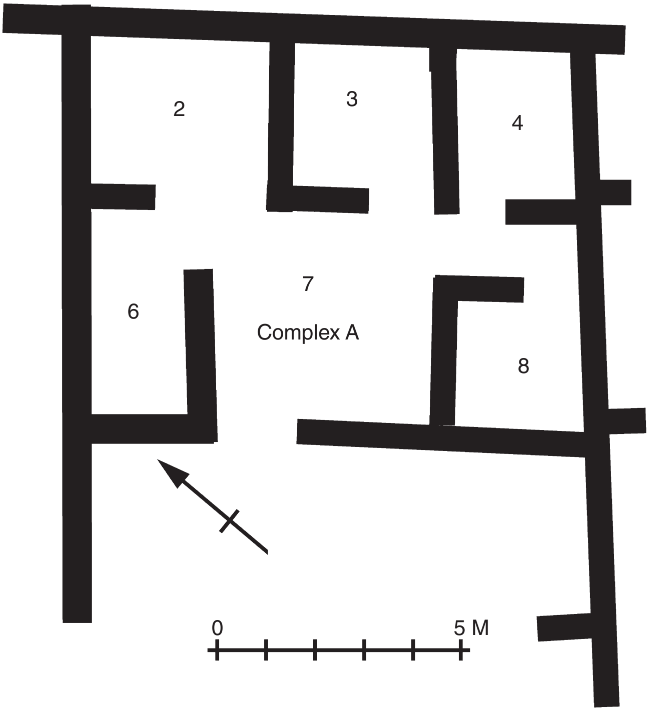


Fig. 13.7. Plan of House A at Pyla-*Kokkinokremos*, late thirteenth–early twelfth century BCE (after Karageorghis and Demas 1984: fig. 4, illustration by L. A. Hitchcock and B. T. O'Neill).

a greater level of entanglement.[9] A plan similar to those found at Pyla characterizes Building I at Maa during the first habitation period (Floor II), an LC IIC2 house, located at the north end of the site. Distinctively, it is one of only two buildings on the site that employs ashlar masonry in its construction.[10] Building I stands out as a dominant building at Maa because of its use of ashlar masonry, distinct plan, and different orientation. Buildings II and IV at Maa are also significantly different from Building I in layout and arrangement. Building II is an axial structure with a rectangular hall, a central doorway in the short side, a central hearth, and a series of side chambers recalling the 'megaroid' form found in postpalatial domestic units on Crete and on the Greek mainland.[11] Hearths were found in several of the large halls with smaller associated rooms on the site, such as Building IV, and may have also been located in outdoor spaces (Maeir and Hitchcock 2011). Thus, Maa clearly exhibits two different co-occurring building traditions, and suggests a situation more complex than a 'Sea Peoples'/Mycenaean colony (*contra* Karageorghis 2011a). It has recently been suggested that based on the date of its foundation, strategic siting on a promontory, and culturally entangled architectural and ceramic differences, Maa functioned as a culturally mixed pirate enclave (Hitchcock and Maeir 2014).

In her study of architecture on both early and later Iron Age Greece, Christophilopoulou (2008) has made a strong case for regionalism among the islands, including east Crete, noting house plans may be apsidal, curvilinear, oval, rectangular, or subcategories of these.[12] Following Nowicki (1999) she observes that the individual household, sometimes with cohesive groupings of households, is one of the main organizing principles of LM IIIC Crete. She bases this on the individual distribution of hearths and ovens in separate houses as at Kavousi-Vronda (Christophilopoulou 2008: 183). However, as at Maa-*Palaeokastro*, Christophilopoulou (2008: 212–13; also Rupp 2014) notes the presence of two distinct building traditions at Halasmenos with both 'megaron' and 'agglomerated' styles of structures. Tsipopoulou (2005) associates these distinct architectural practices with distinct ethnic traditions of Mycenaean immigrants and indigenous Cretans. She also argues for stressing the differences as well as the similarities between postpalatial settlements, observing that Crete was in a transitional era between the highly stratified societies of the palatial Late Bronze Age and the development of an aristocratic later Dark Age (Tsipopoulou 2005: 324). Karphi is similarly distinguished by different building traditions (Wallace 2005). It is also characterized by a dense construction of structures, as is the less differentiated architecture at Vrokastro (e.g. Hayden 1981: 78–83; also McEnroe 2010: 147). The urban fabric is similarly characterized by wide variability at twelfth century BCE Ashkelon as detailed in section 13.3.

Walberg (1995: 87–91) and Maran (2000: 117) have discussed the significance of the abandonment of the monumental hearth in LH IIIC (*c.* 1190–1050/1030 BCE) Greece, noting that architectural plans were modified to suit new social realities. In addition, postpalatial roof supports assumed the form of a central, linear arrangement dividing the room into aisles, minimizing the significance of the hearth, rather than the square arrangement of the previous era which served to emphasise the hearth (Walberg 1995: 90).[13] A recently excavated building of similar style, that is, with a hall of linear arrangement of two columns at Mygdalia Hill, near Patras in Achaea, was presented at the Hesperos conference (Papazoglou-Manoudaki and Paschalidis forthcoming).

Maran (2000: 115–17; 2006; also Wright 1994) has suggested that monumental hearths were linked to a ceremonial and ritual ideology celebrating the *wanax*, and their absence or minimization in the Aegean IIIC world indicates a change in the level of political complexity following the demise of the palaces. Against such observations made through comparative analysis and based on the details, attempts to compare large buildings with small hearths to Mycenaean palaces as done by T. and M. Dothan (1992: 245) for Philistine Ekron (which also has a linear arrangement of columns and

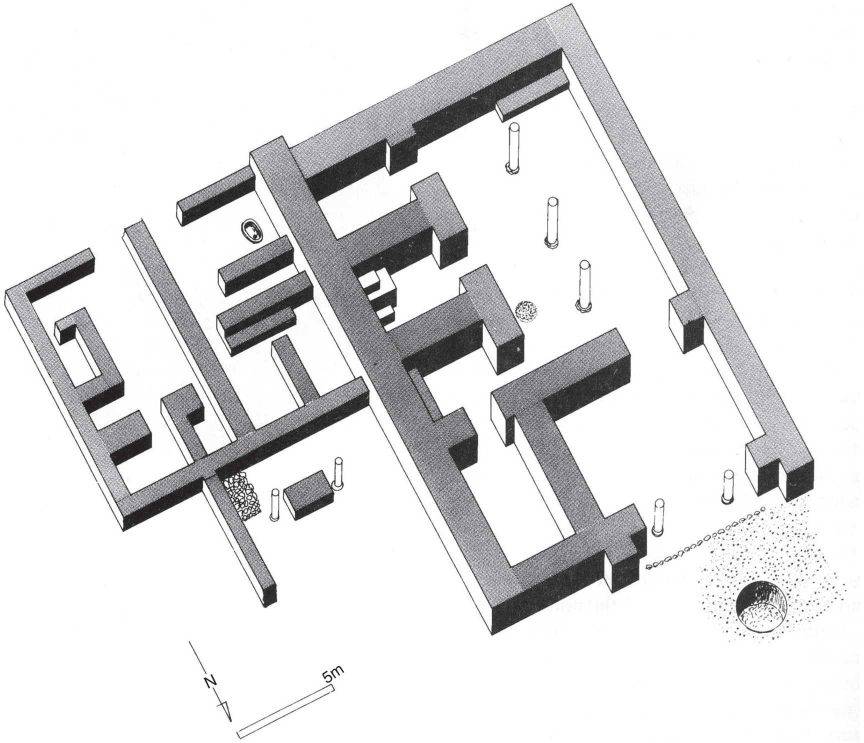


Fig. 13.8. Hearth Building, Building 350 at Tel Miqne-Ekron, Field IV, Stratum VI, *c.* twelfth century BCE (J. Rosenberg, Tel Miqne-Ekron publication project).

off-centred hearth as in Building 350; see now Dothan et al. 2016) (Fig. 13.8) and by Karageorghis (1998: 277; 2002: 87–8) for the ashlar building at Enkomi (Fig. 13.3) become subject to critique and to new interpretations. The diverse distribution of such buildings also suggests a widely disbursed style of re-emerging elite architecture.

13.3. GENERAL CHARACTERISTICS OF EARLY PHILISTINE BUILDINGS

Our understanding of architectural design for the earliest Philistine levels at the Philistine Pentapolis sites at Gath, Ekron, Ashdod, and Ashkelon is somewhat limited, hampered by limited exposure or publication in its preliminary stages at several sites.[14] Both house and hearth construction suggest regionalism in Philistia, along with an emphasis on strengthening social identity among the Philistines through feasting activity. Philistine house construction relied on local materials, while their forms varied between the rectilinear shapes of Mycenaean-influenced houses (Aja 2009) and the pi-shaped or square-within-a-square plans known from Cyprus and from Crete (Hitchcock 2011).

As at Maa-*Palaeokastro*, house plans at the extremely important site of Ashkelon indicate that multiple, entangled traditions existed (e.g. Hitchcock and Maeir 2013) (Fig. 13.9). In addition, Ashkelon shows the greatest diversity in hearth construction at a single site. They are round, rectangular, and keyhole in style. Both sherd construction and mudbrick and cobblestone construction techniques were employed.[15] This stands in contrast to the dominant tradition of pebbled hearths in inner Philistia at Tel Miqne/Ekron and at Tell es-Safi/Gath, a technique of hearth construction that is absent in the IIIC Aegean as noted in section 13.2.

Room 25, a rectangular hall in the north half of the early Philistine sector at Ashkelon, typifies the majority of structures excavated there thus far. In Phase 19, it had a bench against the south wall and a tub in the south-east corner, where a row of spool-style loom weights indicate weaving, and a rectangular, keyhole-shaped hearth was located in the centre (Stager et al. 2008: 266; Aja 2009). One can observe that the spatial pattern of this structure finds parallels at Tel Miqne/Ekron, Ashdod, and Mycenae, and suggest a relatively stable tradition in the region as observed by Dothan (2003). In fact, there is a great deal of diversity in the houses at Ashkelon.

Rooms 873 and 725 are located in the southern half of the Phase 19 area (Stager et al. 2008: 262). They are cater-corner to each other with Room 873 located within and opening into a larger square room designated 1023 on the north and 517 on the west. A rectangular hearth is against the wall of 1023, while an irregular ovoid hearth is placed just off-centre in 873, and a more regular, rectangular hearth is adjacent to the north end of a centrally placed column base in Room 725 (Stager et al. 2008: 262). The square-within-a-square room syntax which characterizes Rooms 1023, 517, and 873 mimics the syntax found in both Minoan and Cypriot houses (Hitchcock 2011). Interestingly, hearths were typically not found in structures with this style of plan, but a round, pebbled hearth has recently been discovered at Pyla-*Kokkinokremos* (Cyprus), which has a similar style of plan.[16] This fits Tsipopoulou's, Rupp's, and Wallace's observations about Halasmenos and Karphi having different traditions within a single site respectively, as noted in section 13.2.

Preliminary findings at Tell es-Safi/Gath indicate that the earliest Iron Age architecture seems to be characterized by a simple, settlement lifestyle (Fig. 13.10), as at other IIIC sites,. In the early Philistine levels in Area A, structures were built on modest foundations of large stones, followed by smaller stones creating a socle approximately 60–65 cm in width to carry a mudbrick superstructure. Elsewhere on the site, in Area F near the summit of the Tell, large mudbricks were used for the foundation course (also minimally

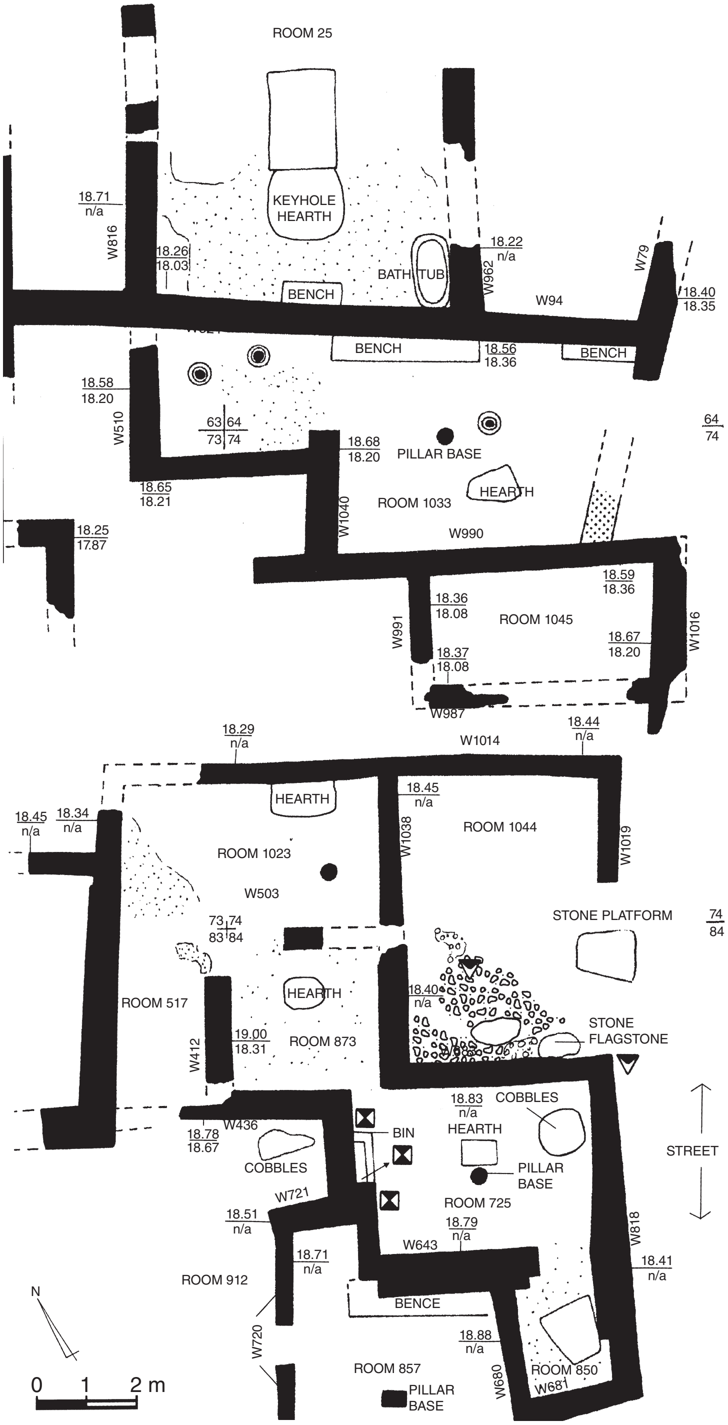


Fig. 13.9. Ashkelon, South Tell, Grid 38, Phase 19, plan of early Philistine area, early Iron Age I (Stager et al. 2008: fig. 15.22, courtesy of the Leon Levy Expedition to Ashkelon).

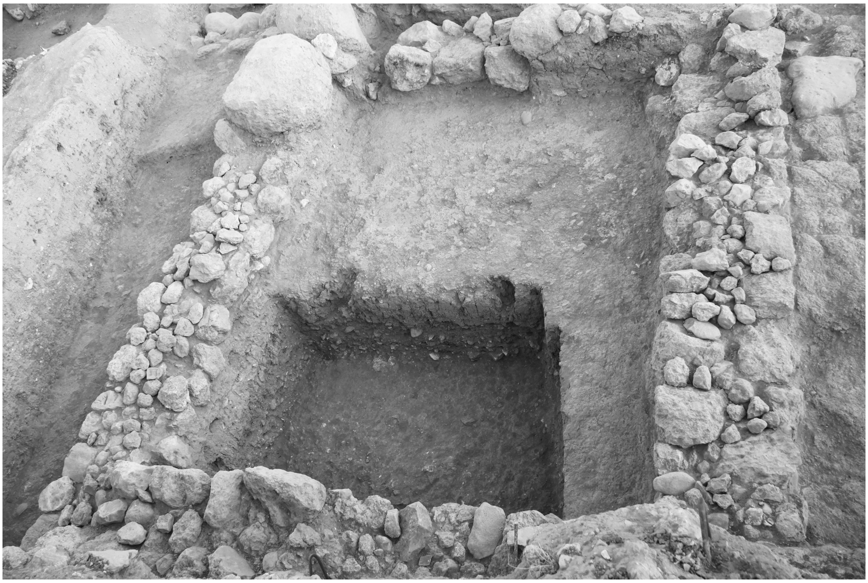


Fig. 13.10. Complete early Philistine room, Area A, provisionally dated to Stratum A6/A7, Late Bronze to Iron Age transition, Tell es-Safi/Gath (photograph courtesy of Tell es-Safi/Gath Excavations).

attested in Area A), a practice also seen at Tel Miqne-Ekron and at Ashkelon (e.g. Aja 2009; Master and Aja 2011). Open spaces with hearths (Fig. 13.11) for social gatherings and an associated landscape feasting remains in pits and dumps (Figs 13.12a, b) were plentiful in Area A at Tell es-Safi/Gath (Hitchcock et al. 2015). Such a landscape of feasting deposits has been well documented in IIIC Crete at Thronos-Kephala, but also appears in evidence at numerous other Cretan sites including (but not limited to) Chania (Hallager and Hallager 2000, 2003) at Kephala-Petras (Tsipopoulou 2012), at Khamalevri (Andreadaki-Vlazaki and Papadapoulou 2005),[17] at Quartier Nu (Driessen, Farnoux, and Langohr 2008a), and at Sissi (Devolder 2009; 2011: 157; 2012). Quartier Nu (cf. Driessen and Fiasse 2011: 286) and Sissi are distinct, however, from Thronos-Kephala, Khamalevri, and Tell es-Safi/Gath (Philistia) in that the pits are more closely situated within the architectural fabric of the settlement. In Quartier Nu, two are next to the south-east and south-west wings of the complex and are convincingly interpreted as feasting deposits, whereas the third is within room II12 and is regarded as a rubbish deposit (Driessen, Farnoux, and Langohr 2008a; Driessen et al. 2008b). Devolder excavated several pits dug in the bedrock and containing feasting debris and refuse material from an earlier phase of Building CD at Sissi. One pit was of a much earlier Early Minoan date,[18] while the two most relevant to this discussion seem to be from the open area between Buildings E and CD

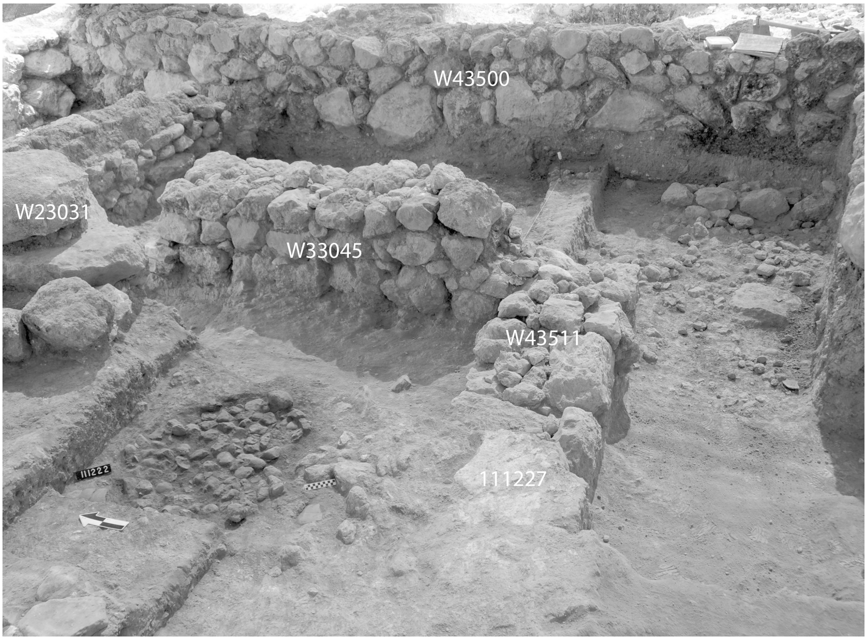
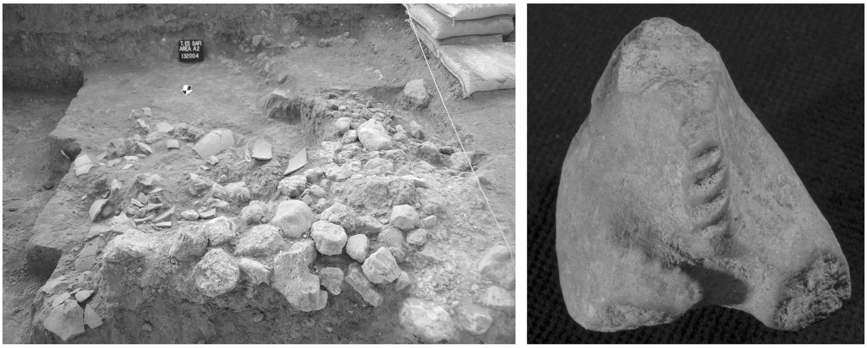


Fig. 13.11. Philistine pebbled hearth 111222 from Tell es-Safi/Gath, Stratum 4, tenth century BCE, identical to hearths of the twelfth century BCE (photograph courtesy of Tell es-Safi/Gath Excavations).

(Devolder 2011: 155; 2012: 117, 120). One of those in the open area contained a layered multi-generational deposit and the other contained drinking ware, dated to Late Minoan IIIB, and architectural fragments (Devolder 2011: 156; 2012: 120).[19] Another deposit excavated along the south facade of Building CD (Devolder 2011: 158) contained materials of a character similar to the rubbish piles at Tell es-Safi/Gath, including decorated drinking vessel fragments, a fragmentary bull figurine, and stone tools (e.g. Hitchcock et al. 2015). If the pits were related to feasting, it nicely complements the information presented by Driessen (see chapter 5). Driessen, Farnoux, and Langohr (2008a: 204) suggest that the inhabitants of LM III Crete created many more pits for ceremonial and/or rubbish deposition than in earlier eras. This seems to suggest a pattern of social activity organized around commensality and construction of memory for promoting social cohesion in the urban landscape of the IIIC era. This merits further investigation,[20] despite some work already done in this field (e.g. Hitchcock et al. 2015; Hitchcock and Maeir 2017; Driessen, Farnoux, and Langohr 2008a; D'Agata 1997–2000).

Although an extensive part of the early Philistine levels has been uncovered in Area A at Tell es-Safi/Gath, only one complete and relatively undisturbed room has been documented (Fig. 13.10). The early Philistine habitations were



(a) (b)

Fig. 13.12. (a) Rubbish or feasting pit 132004, one of many from Area A, Tell es-Safi/Gath, late Iron I; (b) burned figurine fragment (bovine?) 1320463 from feasting deposit, Area A, Tell es-Safi/Gath, context is late Iron I (photograph courtesy of Tell es-Safi/Gath Excavations).

mostly disturbed by the reorientation of the community that followed in the ninth century BCE or Iron IIA (Fig. 13.13). The architecture of the ninth century at Tell es-Safi/Gath in Area A is characterized by massive well-built structures with enormous and megalithic stone foundations.[21] The development of a more skilled masonry technique in Philistia by the ninth century BCE is indicated by special features such as the monumental two-horned altar with flat tops of Cypriot style recently discovered in the lower city (Area D) at Tell es-Safi/Gath (Maeir et al. 2013) (Fig. 13.14). Despite the disturbances caused to the twelfth-century to tenth-century BCE settlement at Tell es-Safi/Gath, by the ninth-century rebuilding there is clear evidence of reuse and curation of the earlier architecture. A single building shows the incorporation of an old (possibly twelfth-century BCE) wall into a later building with six distinct architectural phases (Fig. 13.13). The oldest wall had an extension built over it for the construction of a later building. Cleaning another one of the walls associated with this structure revealed that what had been interpreted in the first excavation report as a single wall was two distinct walls which abutted each other, with one chinked into a connecting wall. As we will see later, careful study of this area showed that floor levels were raised to cover some earlier walls, while continuing to make use of other associated walls. This apparent preference for the extensive modification and long-term re-use of existing structures rather than tearing down and constructing a new building suggests a continued, multi-generational use of the earliest Philistine architecture at Tell es-Safi/Gath. Thus, there was a reorientation of the community with new megalithic constructions in the ninth century BCE.

In separate studies of Aegean architecture, Tomkins (2013) and Haggis (2013) have regarded the reuse of existing structures as a type of 'curation' and

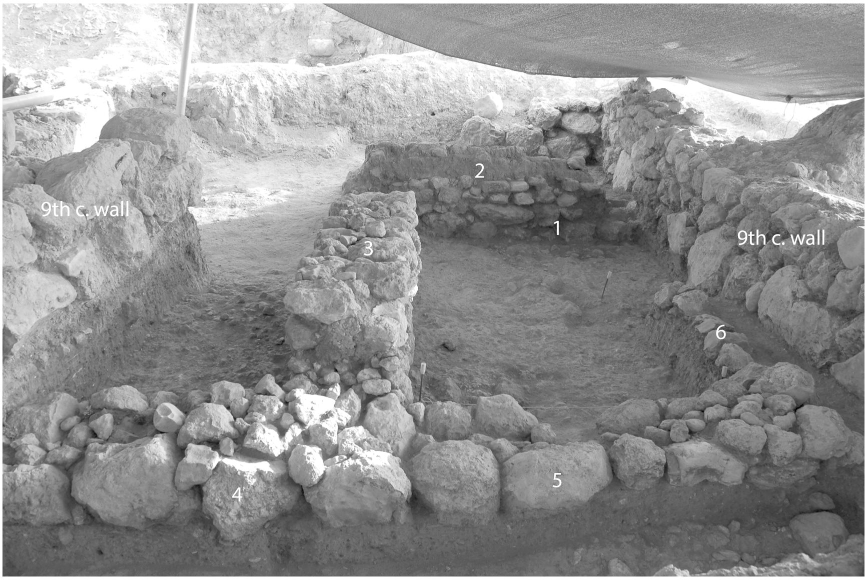


Fig. 13.13. Multi-phase, curated structure, provisionally dated to Stratum A6–A4, early Iron IA–early Iron IIA, disturbed by megalithic limestone walls of building 23033 above it, from the ninth century BCE, Area A, Tell es-Safi/Gath (photograph by L. A. Hitchcock).

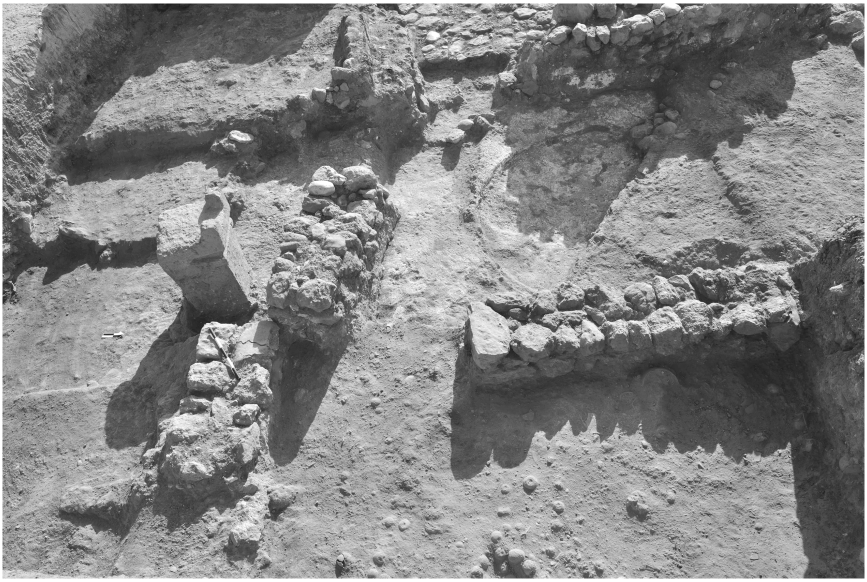


Fig. 13.14. Cypriot-style horned altar, carved from a single block of stone, surrounded by deposit of spherical loomweights, Area D, lower city, ninth century BCE, Tell es-Safi/Gath (courtesy of the Tell es-Safi/Gath Excavations).

as a form of ritualization. Intense curation and re-use also characterizes the site of Marki-Alonia in Cyprus, a single period site from the Middle Bronze Age, closely studied by Frankel and Webb (2012) to argue for intergenerational inheritance and control. In her study of Neolithic buildings from Çatalhöyük, Rogasch (2015) proposes studying architecture from the perspective of writing building biographies, taking into account multiple stages such as construction, use, modification, use, and abandonment. Such a proposal is based on object biography (e.g. Maeir et al. 2015) and as such, might also be expanded to include the conditions of disuse (for example, destruction, abandonment, or termination rituals) and rediscovery—the re-inscription into a new context in the present. These perspectives illustrate an important feature of comparative analysis—that of bringing new insights to the interpretation of patterns in architecture and different ways of approaching architecture, rather than simply using such analyses to look for influences, interconnections, or other forms of cultural diffusion. Haggis (2013) has noted that at particular times in Greek prehistory there has been a preference for curation or reuse of architectural remains, which he characterizes as a 'phenomenology of the static,' while at other times there was an emphasis on dynamic change and reorientation of the community. The situation at Karphi was interpreted as even more 'static' for the east sector of the site, with little modification of the architecture between construction and abandonment (Wallace 2005: 262).

An emphasis on detailing construction techniques can illustrate regional distinctions that become lost without such scrutiny (see chapter 1). Much of our work in the central part of Area A at Tell es-Safi/Gath has focused on defining what was probably a domestic structure, with a complicated history of construction and reuse, built on modest foundations of small stones (Fig. 13.13). Although, as evoked earlier, Iron IIA rebuilding of the ninth century BCE disturbs the plan of this structure there is clear evidence of architectural reuse with older walls being extended, floor levels being raised to cover some earlier walls, and continued use of other walls. These modifications indicate a continued preoccupation with multi-generational reuse or 'curation' of architecture. The preference for curation over rebuilding promotes cultural continuity with the past, which was deemed no longer necessary in the ninth century BCE.

Within part of this older, curated building twenty-four unbaked loom weights were documented Cassuto (2012: 469) (Fig. 13.15). They were in a pyramidal form as found in Cyprus, but were in a poor state of preservation on a Stratum A4 (eleventh to tenth centuries BCE) beaten earth floor associated with wall 43511 just to the north of it. Careful study of this wall showed it to be two separate walls that abutted each other. The west end of this wall was later covered by a chalk plaster surface excavated in 2008 and associated with an activity area, which a chalk stone pavement, goat pit, sherd surface, and pebbled hearth dated to the mid-tenth century BCE by ^{14}C, by pottery, and

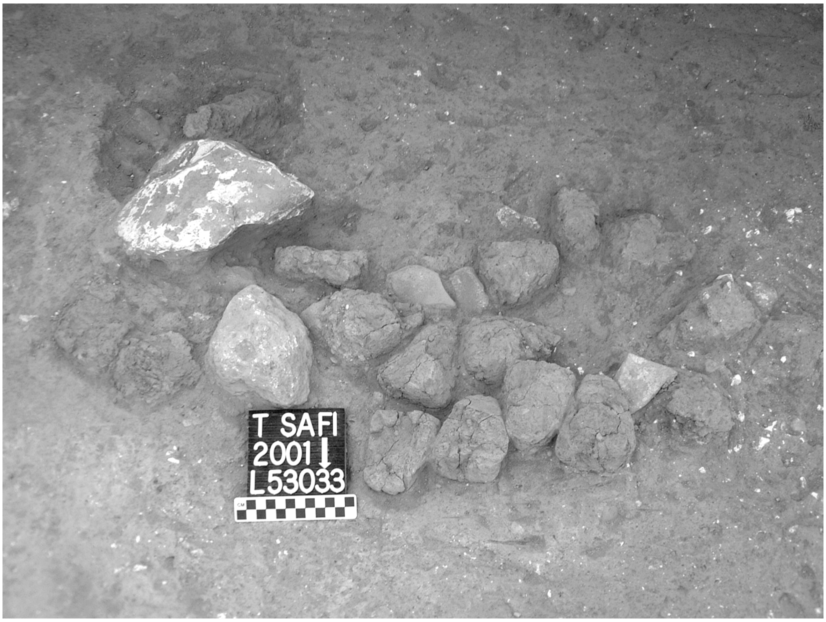


Fig. 13.15. Loom weight deposit associated with curated building in Area A, early Stratum IV (eleventh or tenth century BCE) (photograph courtesy of the Tell es-Safi/Gath Excavations).

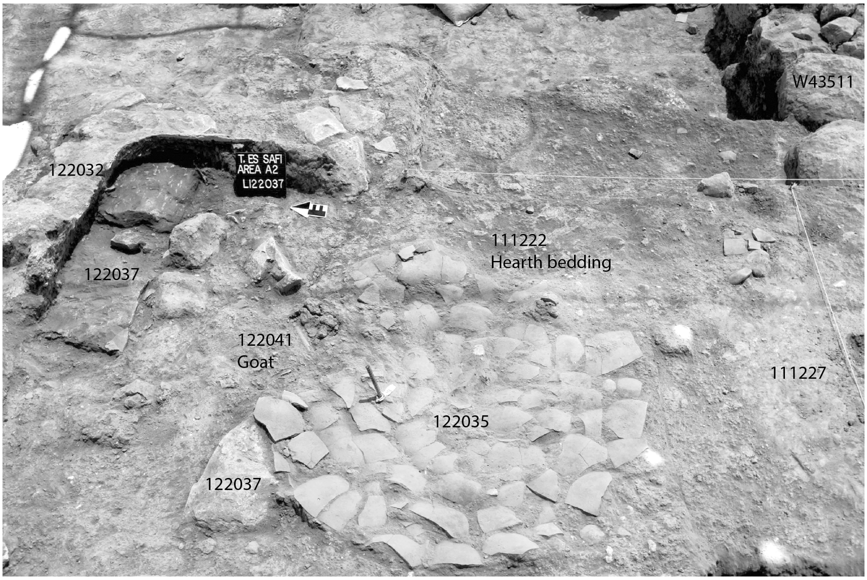


Fig. 13.16. Philistine sherd surface and surrounding features including goat pit, bedding of pebbled hearth (removed earlier), and chiselled pavement, Area A, Stratum IV Tell es-Safi/Gath, Area A, Stratum A4 middle–late, tenth century BCE, late Iron Age I/ early Iron Age IIA and surrounding features (photograph courtesy of Tell es-Safi/Gath Excavations).

by a sealing in the style of the time of Pharaoh Siamun found within (Hitchcock et al. 2015) (Fig. 13.16). We believe this activity area was associated with the north–south wall with doorway and pivot stone just to the north-east of it (Fig. 13.13, wall 3). This would make the loom weight surface an earlier A4 stratum[22] and place the activity area in what we are now calling Stratum A4 middle–late. As we completed removal of the ninth-century BCE wall to the west of the activity area we found a series of earlier strata, older than the ninth-century BCE wall and the tenth-century BCE hearth-activity area, but later than the loom weight deposit. These include a burned area below the ninth-century BCE wall with a cluster of over one hundred olive pits. Beneath this olive pit cluster was a chalk plaster surface. The chalk plaster surface continues east and its preserved remnants indicate it extended under the hearth-activity area. We tentatively call these two layers (olive pits and chalk surface) Stratum A4 middle, although ^{14}C dating of the olive pits may enable us to further refine this chronology. The ceramics were not diagnostic. The Stratum A4 middle chalk surface below the ninth-century BCE wall and further below the hearth-activity area to the west is a cut for a foundation trench for a north–south wall (Fig. 13.17), making this wall still later than the chalk plaster surface but earlier than the ninth-century BCE wall (also Asscher et al. 2015).[23]

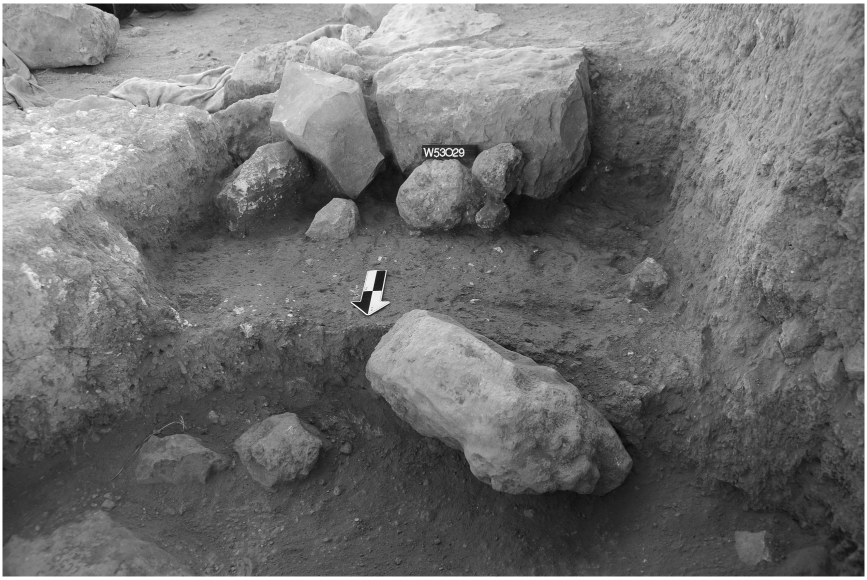


Fig. 13.17. Foundation trench cut into Stratum A4 middle chalk surface for later Stratum A4 wall, tenth century BCE, Area A, Tell es-Safi/Gath (photograph courtesy of Tell es-Safi/Gath Excavations).

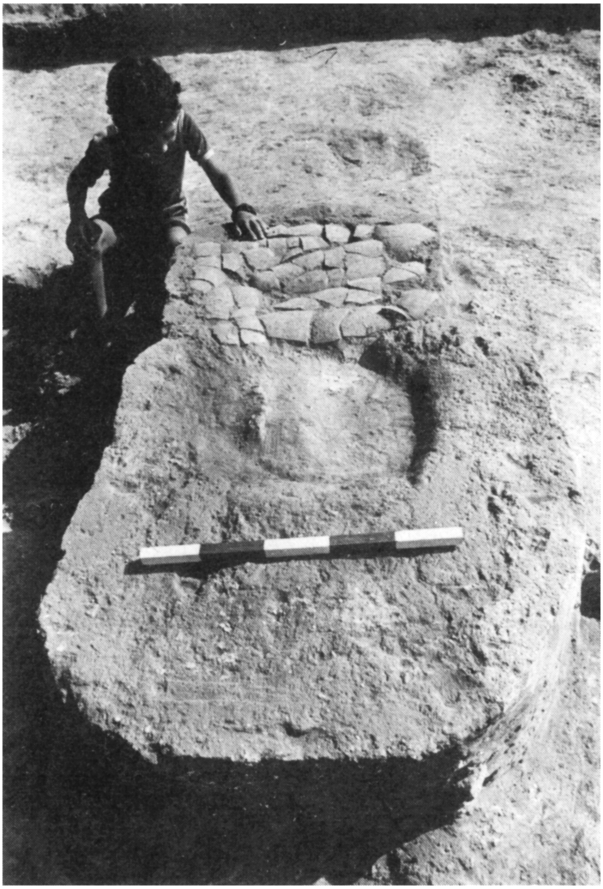


Fig. 13.18. Keyhole hearth made of clay and sherds from Building 335 (the hearth building), Area C, Stratum XII, Tel Qasile, Philistine II (with permission of Prof. A. Mazar, Hebrew University of Jerusalem).

Our analysis of Philistine hearth construction (Maeir and Hitchcock 2011) made it possible to depart from simplistic comparisons of Philistine culture with Mycenaean culture. It also enabled us to document a great deal of regional diversity within Philistia, Cyprus, and the Aegean. Hearths in coastal Philistia were constructed of clay, clay and pebbles, or clay and sherds. As mentioned earlier, they may be round, square, ovoid, or keyhole (Fig. 13.18) in shape (Maeir and Hitchcock 2011, with further references). Most of them seem to have been located in buildings, which would promote diacritical feasting activity.[24] In contrast, locating pebbled hearths in open, outdoor areas in the interior of Philistia may have promoted larger, communal gatherings. Such gatherings seem to have occurred within the context of drinking and eating activities that included drinking sets consisting of

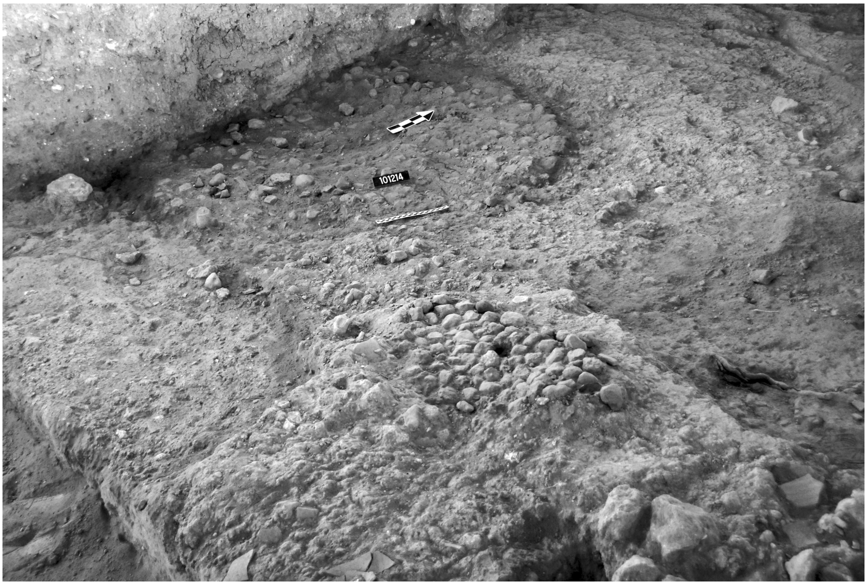


Fig. 13.19. Overlapping pebbled hearths, Area A, Stratum 5, late Iron Age I, Tell es-Safi/Gath. Note the higher hearth in the foreground is of irregular shape or partially preserved (photograph courtesy of the Tell es-Safi/Gath Excavations).

locally made Mycenaean style kraters and deep bowls. Such displays and performances of sociality would have fostered nostalgia, heightened by the effect of alcohol, and recalling a past that may have become mythologized through spatial and temporal distance, strengthened community bonds, and/or promoted the status of particular individuals (Hamilakis 2013: 135; 2008; Hitchcock 2008b).

There are numerous instances of hearths in open areas being renewed through superimposition at Tell es-Safi/Gath for as yet no clear functional reason (Fig. 13.19). The activity of constructing and renewing hearths might have been linked to promoting certain individuals or factions in the performance of competitive displays of sociality as a means of competing for leadership (cf. Maran 2006: esp. 143–4).[25] A similar situation may have existed at Tell Miqne-Ekron, where Dothan (1998: 157) mentions a large open area where twenty-five hearths were found in two superimposed layers at the top of the acropolis, which she associates with a special communal function.

Whatever the precise purpose of gatherings around external hearths may have been, the public display of shared symbolism would have served as an additional mechanism to foster and strengthen bonds of cultural and corporate identity among the Philistines at Ekron and at Gath, perhaps necessitated by their distance from the coastline. As the Philistines at Tell es-Safi/Gath became more culturally established in the region, and perhaps as certain families became paramount, the role of mythologized memories, nostalgia, and the need for large-scale communal social activity may have decreased and social activity may have been channelled into more interior spaces. A similar series of activities has been postulated for the numerous pits excavated at Thronos-Kephala by D'Agata, whose work has helped us develop our ideas about a similar urban landscape at Tell es-Safi/Gath. Similar activities have also been hypothesized for the LM IIIC feasting pit at Petras-Kephala by Tsipopoulou (2012: 129), where less evidence is available due to poor preservation, and can be argued for Chania where there is limited exposure. It is significant that a preference for Mycenaean-style cooking jugs is in evidence not only in Philistia but also at Petras (Tsipopoulou 2012: 127) and at Chania.[26] In LM IIIB and in LM IIIC, Chania was also characterized by a curation of LM IIIB architecture and the creation of numerous and stratified LM IIIC rubbish deposits that included decorated ceramics, animal bones, and symbolic items such as bronze hooks, a bronze arrowhead, a violin bow fibula, a polished boar's tusk, a piece of pumice, an assortment of stone tools, a few spindle whorls, and two stone vessel fragments (as detailed in Hallager and Hallager 2000: 103–13, pls 32–4, 104–7). Having this comparative evidence makes it easier to understand what is going on at other IIIC sites, by enabling us to build an archaeological fingerprint of the cultural processes taking place at this time.

At Tell es-Safi/Gath, the Iron IIA structures of the ninth century BCE retain a similar orientation to the earlier Iron I structures, but they represent the result of a completely new reconstruction of and a dynamic reorientation of the settlement using different building techniques in the form of massive megalithic-style stone foundations.[27] The builders maintained links with the past through the reuse of earlier worked stone such as a hammer dressed column base,[28] found while dismantling the remaining remnant of a ninth-century wall (Fig. 13.20).[29] This is significant because its discovery suggests the presence of at least another earlier public building at Tell es-Safi/Gath in addition to the columned hall excavated to the west several years ago and discussed below. As we argued above, it continues a practice of maintaining links with the past. Removal of this ninth-century BCE wall and careful excavation of the baulk beneath revealed the complex array of stratified features that we have already mentioned.

The plan of one of these ninth-century BCE structures, Building 23033 (Zukerman et al. 2007: 66, Fig. 8), preserves some clear Mycenaean-style characteristics (e.g. Hitchcock 2010) (Fig. 13.21). It is composed of a hall with porch employing approximate 1:2 proportions and four side-chambers, but it is lacking the circulatory corridor separating the hall from side-chambers as found in canonical megara.[30] Its special character is reinforced by some of its finds that may be regarded as connected with Canaanite and

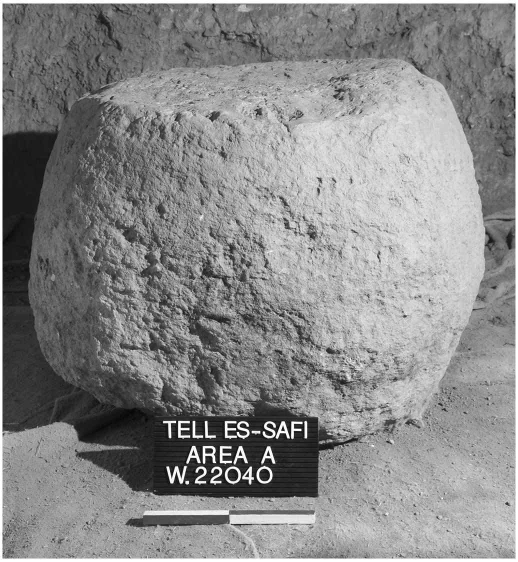


Fig. 13.20. Reused column base, hammer dressed on the sides to create a flat top surface, from ninth-century BCE wall 22040 at Tell es-Safi/Gath (photograph courtesy of the Tell es-Safi/Gath Excavations).

Cypriot ritual practices, including chalices and notched scapulae (see now Szanton 2017 for a spatial analysis of this structure). Thus, the building promoted an exotic and entangled set of foreign and local connections. The plan of Building 23033 and use of enormous stones as well as a reused column base in its construction indicates that it was a special building which required planning and mobilization of labour to construct (cf. Hitchcock 2011; McEnroe 2010). Frizell (1997–8: 114) has discussed how moving blocks into place at Mycenae must have been a performative and theatrical event similar to what Wright (2009: 50; see also chapter 4) has discussed with regard to architectural construction as a social and performative series of events in the Mycenaean world. However, such a demonstration of power does not characterize all domestic architecture of the ninth century BCE. In the lower city the earlier tradition of small stone socles is continued, despite other important features such as the horned altar and a gate and fortification system discovered in 2015 (Bar-Ilan University 2015). Architecturally, Crete does not always show the same level of sophistication and reorientation by this era, as exemplified by reuse and rebuilding of existing houses as on Kavousi-Kastro (Christophilopoulou 2008: 184–96). Although Prent (2005 esp. 223) suggests that the renaissance of the Geometric period had an earlier beginning, an increase in wealth in the early Protogeometric period seems to be mainly indicated by graves, dedications, and grave goods in the form of ceramics and metal items.

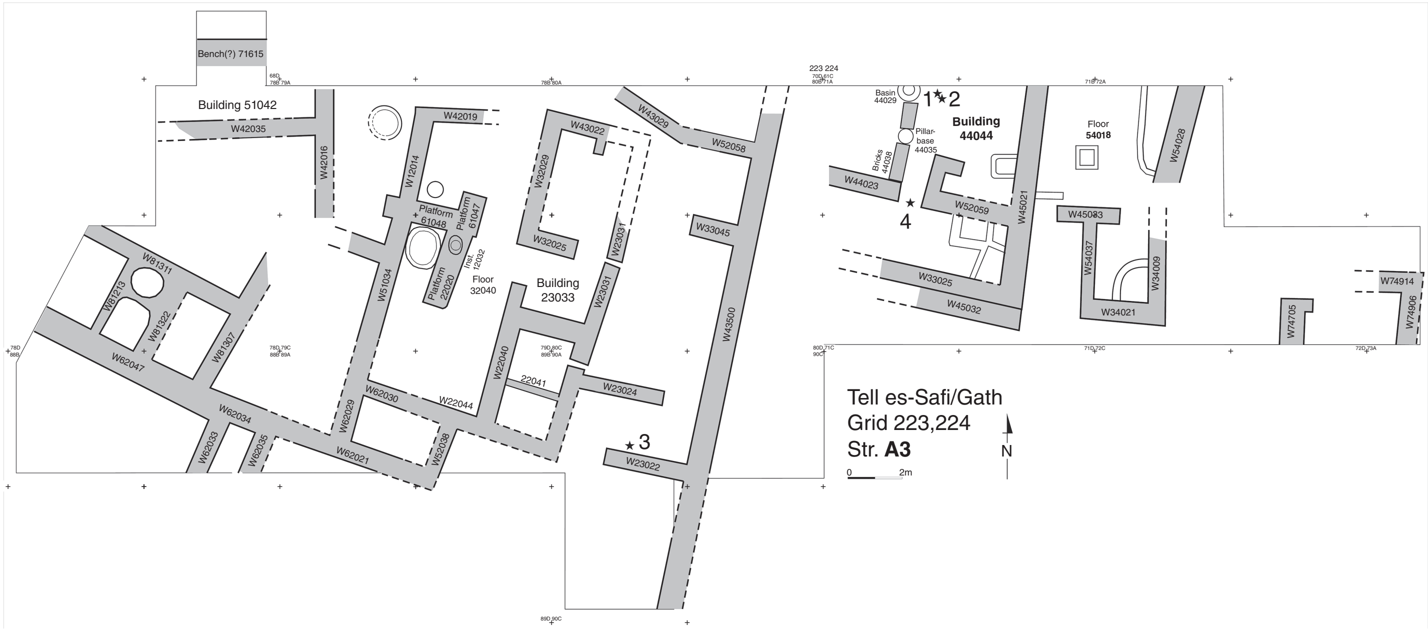


Fig. 13.21. Plan of Building 23033, Stratum A3, ninth century BCE, Area A, Tell es-Safi/Gath (photograph courtesy of the Tell es-Safi/Gath Excavations).

13.4. REGIONAL COMPARISON BETWEEN DOMESTIC AND RITUAL BUILDINGS IN THE AEGEAN AND THE EAST

Elite buildings in early Iron Age Philistia have tended to be interpreted as cultic and linked to Mycenaean temples, which may in turn, share characteristics with Canaanite ones as at Tel Mevorakh (Hitchcock 2005). Added to these is the growing corpus of LM IIIC temples, shrines, and elite complexes excavated on Crete.[31] The latter includes Quartier Nu at Malia and the recently excavated complex at nearby Sissi.

The Philistine temples from Stratum X at Tel Qasile (Mazar 1980) (Fig. 13.22) and at Tel Miqne-Ekron, such as Building 350 (Fig. 13.8) (e.g. Dothan et al. 2016) share certain features in common with Canaanite, Cypriot, and Mycenaean temples. These include a rectangular hall supported by columns, a platform and/or benches to display the cult figures and offerings, rooms in the rear to store ritual paraphernalia, possibly a corner doorway, and a substantial quantity of ritual material. Though lacking some of these features, a recently uncovered structure on the western side of Area A at Tell es-Safi/Gath (Stratum A6–A4) is regarded as a temple by one of the authors (Maeir 2012: 27–30) and as an elite building entangled with Aegean characteristics by the other. The Tell es-Safi/Gath structure was provisionally in use from the twelfth century BCE through to the Iron IIA period (Figs 13.23a, b). The presence of two finely worked column bases in a squarish hall (worked masonry being rare in early Philistine contexts), evidence for communal gatherings taking place nearby to the east in the form of hearths and rubbish deposits, and continuity of practice with a cult corner rich in ritual finds found in the ninth-century BCE levels immediately above it, confirm its importance. Furthermore, the later cult corner was associated with a metallurgical installation where both copper and iron production were taking place (Eliyahu-Behar et al. 2012). The relationship between these two features follows a pattern—namely a relationship between cult and metallurgy as established for Cyprus by Knapp (1986).

The form of the 'temple' at Tell es-Safi/Gath,[32] its formal similarity to other structures interpreted as temples, and the continued importance of the area as indicated by the cult corner and metallurgical area make it tempting to regard this building as a temple despite a lack of cult finds in the same concentration found at similar buildings at Tel Qasile (Mazar 1980), Phylakopi (Renfrew 1985), and at Mycenae (Whittaker 1997).[33] However, if we compare it to buildings from the postpalatial era on Crete, other interpretive possibilities are opened up. Squarish or rectangular halls with column bases not only typify Mycenaean cultic structures but form the core of important elite complexes as at Quartier Nu at Malia, which had several phases of construction and occupation but had its heyday from Late Minoan IIIA2–IIIB2 (Driessen and

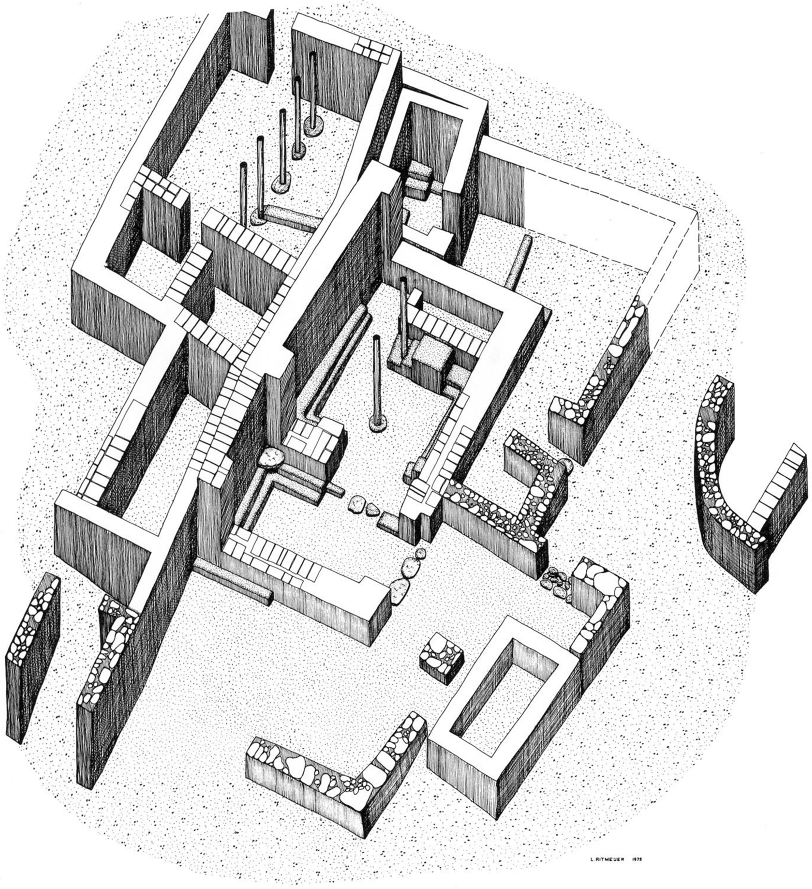


Fig. 13.22. Isometric reconstruction of the Temple Precinct in Stratum X, Iron IB, eleventh–tenth centuries BCE, Tel Qasile, Israel (with permission of Prof. A. Mazar, Hebrew University of Jerusalem).

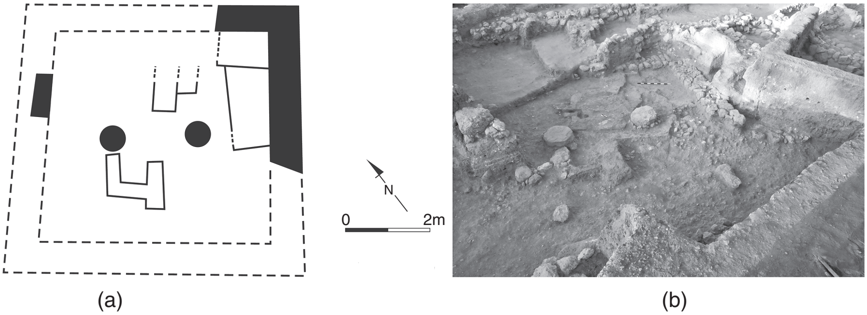


Fig. 13.23. (a) Plan of Philistine temple or elite building, early Iron IIA, Area A, Tell es-Safi/Gath; (b) Philistine temple or elite building, early Iron IIA, Area A, Tell es-Safi/Gath (photographs courtesy of the Tell es-Safi/Gath Excavations).

Fiasse 2011: 60; Driessen et al. 2008b). This enormous complex of approximately 750 m^2 consisted of three carefully planned but independent wings around a central court (Driessen et al. 2008b: 93, 97). It could have accommodated a large, extended family[34] involved in extensive feasting activities, as indicated by the artefacts and the associated pits (Driessen, Farnoux, and Langohr 2008a; Driessen et al. 2008b). One of the core rooms, X22, included two axially aligned column bases with a hearth between them, features that typify structures at the Cult Centre in Mycenae, a number of Philistine structures at Tel Miqne-Ekron (Mazow 2005), and even in the later Chieftain's House at Kavousi-Kastro. Several other halls with hearths and column bases are attested at Quartier Nu, but lack the sophisticated parallels of the *comparanda* found in Mycenaean temples as discussed above (also Driessen et al. 2008b: 96). Building CD at nearby Late Minoan IIIB Sissi is particularly interesting with regard to its architectural and artefactual linkages with the Sea People. Among them is a recently discovered deposit of over fifty spool-style loom weights, the earliest and largest found in the Aegean (Gaignerot-Driessen 2012; Cutler 2016: 178–81).[35] Building CD at Sissi was 450 m^2 and was composed of at least twenty ground floor rooms and spaces, organized around two large halls, a columned hall[36] 3.1 and a pillared hall with hearth 4.11. Porches gave access to both halls, and pillared hall 4.11 was connected to shrine 3.8. The shrine was lined with benches and its finds included two triton shells,[37] two cult stands, six kalathoi, and a deer antler. Understanding of the building is preliminary, but it seems to have been occupied by a single group and served as a locus for larger group activities. The pillared hall, 4.11, was slightly smaller, but was distinguished by two pillar bases, with a triangular, reddish clay hearth between them.[38] Driessen (see chapter 5) discusses in this volume the possibility of the distinct gendering of the two halls, based on distinct and complementary artefactual associations.[39] It is entirely plausible that these architectural forms could have also influenced early Philistine elite architecture. In addition, the excavators (Gaignerot-Driessen 2011: 100; Driessen and Fiasse 2011: 286) note the similarity in axial plan, arrangement of column bases, and size of the buildings at Quartier Nu and at Sissi to the 'Hall of the Hearth' at LM IIIC Kephala Vassilikis (Eliopoulos 2004; Klein and Glowacki 2009: 157, 159–61). Wallace (2011: 329–30) suggests that the Karphi and Monastiraki-Halasmenos megara, Vronda Building A-B, and the complex at Kephala-Vassiliki represent 'purposefully designed secular feasting units built to a flexible template that deliberately concentrated certain "Mycenaeanizing" elements' that may cluster or occur in combination with feasting assemblages. These elements include axial entrances, full-width anterooms, central hearths, and the placement of one or more column bases in the main room. They represent more formalized settlement configurations for the promotion of diacritical commensality than the open air pits and hearths that also occur in the IIIC period as at

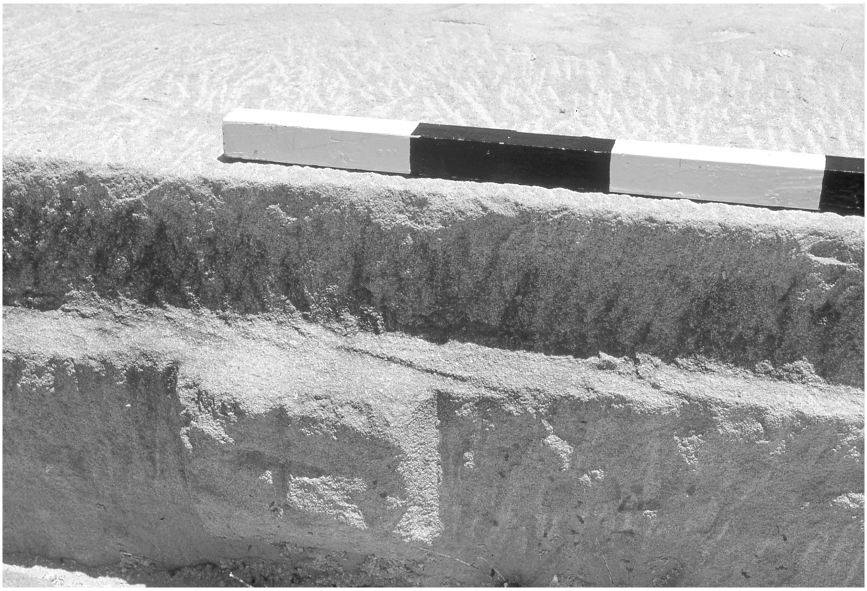


Fig. 13.24. Cypriot ashlar block with mason's mark on lifting boss from Building X, Kalavassos-*Ayios Dhimitrios*, Late Cypriot IIC, thirteenth century BCE (photograph by L. A. Hitchcock).

Thronos-Kephala and at Tell es-Safi/Gath (Hitchcock et al. 2015; Hitchcock and Maeir 2017).

What all of these types of column and/or pillar hall buildings suggest, for the occurrence of this form in Philistia, is that columned halls need not be always understood as temples and a wider range of possibilities may be considered. However, secular and religious distinctions may not always be clear cut and Eliopoulos (1998) has argued for the cultic nature of Kephala-Vasiliki, which contained a baetyl and a significant amount of ritual material. However, many of these finds come from the two outward-facing rooms (McEnroe 2010: 152). Kephala-Vasiliki is also important as it establishes a chronological link between the architectural designs found earlier at Malia and Sissi, at a comparably similar time in Philistia at Tel Qasile and at Tell es-Safi/Gath, and later still in Crete in the 'Chieftain's House' on Kavousi-Kastro and in the Geometric Period temple at Dreros. The diversity of functions that may be assigned to elite architecture in the form of columned or pillared halls in postpalatial Crete make it possible to interpret the columned hall at Tell es-Safi/Gath as an elite building, based on the worked column bases, on the plan, and on feasting ware observed on one of its floors. It also remains possible that it was a temple that was cleaned out. Some mudbrick installations in the 'temple' may have been platforms; however, benches were found in the columned hall at Kephala-Vasiliki in the non-cultic rooms. Clearly the columned hall at Tell es-Safi/Gath was important, and this importance was retained in cultural memory through the construction of the metallurgical installation and of the cult corner above it (Figs 13.23a, b). In this sense, the columned hall at Tell es-Safi/Gath functioned in a biographically similar way to a foundation deposit, establishing a highly charged symbolic link with the past. Thus, a comparative approach can open up rather than close off the interpretive possibilities, particularly with special buildings where fewer examples are present (e.g. Wallace 2005: 268).

13.5. CONCLUSIONS

To conclude, our picture of urbanism in the postpalatial Mediterranean has vastly changed in the last forty years. Excavations of LM IIIA–IIIC sites in Crete have provided us with a richly varied and complex picture of the Mycenoan (e.g. Tsipopoulou 2005) ethnogenesis of the Postpalatial era. Archaeological discoveries in Cyprus have pushed the widespread use of ashlar masonry with drafted margins backward into the thirteenth century (Fig. 13.24), confirming it was a Cypriot rather than a Sea Peoples innovation or a Mycenaean import. Sites that escaped destruction in Cyprus (e.g. Iacovou 2008) show that the phenomenon of collapse was not a uniform one. The new discoveries at Philistine sites are being published at a startlingly rapid pace. Thus, interpretations of IIIC settlement remains should be strongly grounded in available data, knowledge of *comparanda*, and sound theoretical frameworks, and must proceed with caution tempered by intellectual openness, curiosity, and a willingness to be flexible in our assessments. The role of space for the display and manipulation of symbols and the performance of sociality, the curation of architectural remains, the preference for columned halls, the transitional and mixed nature of the buildings, and the indication of smaller scale societies seem to be key areas of similarity between Philistia and the Aegean—both in Crete and on the mainland. The transitional and mixed character of buildings also characterizes Cyprus, which, however, is also distinguished by important cult centres as seen at Enkomi, Kition, and Kouklia-*Palaepaphos*. The importance of the hearth as an ideological symbol and as a locus for external gathering (versus internal gathering) in Philistia and, to a limited extent, in Cyprus seems to be a key distinction; however, more detailed studies are warranted. In identifying patterns in the use of spaces for the performance of identity over a broad area, we need to also remember that each site discussed is part of a wider region, with its own regional differences. There are now many well-documented examples of Aegeanization of architecture outside of the Aegean. Rather than simplistically ignoring it or viewing it as evidence of colonization and diffusion (Hitchcock and Maeir 2016), more subtle approaches are called for. These more nuanced approaches include insights gained from comparative analyses of similarities and differences, consideration of emulation and/or entanglement, cultural mixing, small-scale migration, and the role of space and place in the re-emergence of civilizations in the Iron Age.

ACKNOWLEDGEMENTS

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NOTES

1. IIIC pottery producing cultures and 'IIIC phenomenon' is taken here to include the various regional cultural manifestations in the central and eastern Mediterranean where Mycenaean IIIC style pottery is locally produced, such as (but not limited to) LH IIIC, LM IIIC, LC IIIC, Philistine I.
2. Kanta (2014c: 116–17) presents a LM IIIC keyhole hearth made out of pebbles from the Anetaki plot Knossos, which shares similarities to both Cypriot and Philistines pebbled hearths and to keyhole shaped hearths at Tell Qasile and Tiryns. For a more nuanced view of Cretan hearths and their different contexts and symbolisms, see Letesson 2015.
3. Briault (2007: esp 254–6, 259–61) suggests that a pottery motif may have served as the mechanism of transmission for double axes and horns of consecration in general.
4. Feldman (2014) suggests that ivory carving might have co-occurred with stone carving, thus it may not be coincidental that the Minoan palace at Kato Zakro, where unworked ivory was found, also housed a stone vase-makers workshop (Platon 1971: 210–21, esp. 217).
5. The term temple is not favoured in the early Iron Age Aegean (see Klein and Glowacki 2009; but contrast with Eliopoulos 1998). Kavousi-Vronda is also distinguished by Building A-B, the 'Chieftain's House', indicating more social differentiation than at other LM IIIC sites (e.g. McEnroe 2010: 155).

6. Karageorghis (2011b: esp. 89; 2014) suggested that Cretans formed a substantial amount of the refugees settling at Pyla, which he subsumed under the essentializing term 'Aegeans', observing that there was an 'abnormally high percentage' of Late Minoan IIIB storage jars there (also Karageorghis and Georghiou 2012). Now, Bretschneider and colleagues (2015) refer to the 'surprising ethnic mix of material culture' at the site (see also Georgiou 2014).
7. The abandonment of Pyla is dated to *c.* 1175 BCE based on the presence of imported LH IIIC pottery (Kanta 2014a: 111).
8. On the 'Type 3' house, see McEnroe (1982, pp. 10–13, fig. 3). With new excavations taking place at Pyla, our understanding of the site may change (e.g. Bretschneider et al. 2015; Karageorghis and Kanta 2014).
9. Alexander (1998: 490) observes that under processes of colonization the architectural landscape is transformed, while in situations of entanglement the presence of foreign architectural styles may indicate small numbers of non-locals or emulation of a core polity. In addition, there is a differential distribution of attributes with regard to vernacular versus civic structures. Other traits of the material culture at both sites—Aegean (Minoan and Mycenaean) and Canaanite ceramics and metalwork at Pyla; Canaanite and Mycenaean IIIC ceramics at Maa—suggest an entangled culture. Our use of the concept of entanglement derives from the work of Philipp Stockhammer (2012a, 2012b). An entangled approach emphasizes the materiality of the object and its spatial relationship to context, which permits the reconstruction of the relationship between the object and agents (its makers, owners, and/or users are primary concerns). Stockhammer (2012a: 46–8; 2012b) distinguishes between 'relational entanglement' whereby new meanings become attached to a foreign object, which may even be transformed into a personal possession, and 'material entanglement' whereby a newly created object combines the familiar with the foreign, and may become appropriated and entangled with foreign social practices as well as local ones. We similarly promote a transcultural approach, which resists the duality implied by definitions of hybridity (situated in nineteenth-century practices of cross-breeding of plants and animals) and emphasizes the intentionality behind the use of an object. A transcultural approach regards the emergence and transformation of identity as multivocal, drawing on the symbolisms, objects, social practices, and artistic and technical styles of a broad cultural and ethnic range of interacting social actors (see also Hitchcock and Maeir 2013).
10. The ashlar is reused. The other building using ashlar masonry is a two-roomed tower just north of Building I and constructed on the same orientation, as detailed by Demas (1988: 15–16).
11. On the megaroid form, see Preziosi 1983: 177–93.
12. Christophilopoulou (2008: 149, 278) takes these observations a step further, stating that there is nothing in the Cyclades and eastern Aegean to indicate a significant Mycenaean influence on megaron-shaped buildings of the early Iron Age, citing the greater number of apsidal and oval houses in these regions.
13. This change could also be linked to functional purposes with regard to a reduced amount of space needing to be spanned. See discussions by Wace (1949: 77) and Holland (Wace et al. 1921–3: 279) who calculate the base to height ratio of

columns based on the amount of load that columns bore as related to the amount of space that needed to be spanned.

14. Gaza remains largely unexplored as it is covered by a densely populated contemporary city.
15. Which hearths utilize which form of construction is not thus far detailed in preliminary reports. Karageorghis (2011a: 22, n. 1) cites a personal communication from L. Stager that a total of sixteen hearths have been found at Ashkelon, always inside domestic structures.
16. Other structures at Ashkelon include Room 667, a squarish hall of Phase 18 (Stager et al. 2008: 266), dominated by a large circular hearth. A rectangular hearth with a sherd covering is located roughly in the centre of Room 910, where it is placed adjacent to a column. It is associated with a bench and with several bins (Stager et al. 2008: 266). Room 850 (Stager et al. 2008: 262–3, 265; figs 15.27–9) was paved with cobblestones and the walls were panelled with mudbricks set on edge to resemble orthostats, a characteristic with both Canaanite and Aegean traditions. Room 1033 is a rectangular hall with back room at west end—it had a central column and two mudbrick and cobblestone hearths to the south-east. For more detail on Ashkelon, see <http://digashkelon.com/current-projects>. The pebbled hearth from Pyla (Kanta 2014b: esp. 12–13) re-enforces our suggestion (Maeir and Hitchcock 2011) that the Philistine pebbled hearth is a Cypriot innovation.
17. Eleven pits dominate the urban landscape at Khamalevri, where the architecture is also better preserved, but not to the same dramatic extent as at Thronos-Kephala where over fifty pits have been documented (e.g. Andreadaki-Vlazaki and Papadapoulou 2005; D'Agata 1997–2000, 2000).
18. The deposition of vessels and pits at Sissi, representing multiple periods including EM, MM, and LM I as well as LM IIIA and B, suggests a long history of similar disposal practices at the site, with pits that were both filled over time and others that represent single events (Devolder 2011, 2012).
19. The excavator interprets it as the cleaning of a destruction deposit.
20. Certainly both egalitarian and diacritical feasting enjoyed a long prehistory in the west and east Mediterranean. However, there are shifts in practice over time, as argued for the IIIC era by Hitchcock and Maeir (2017). And, as Tomkins (2007: esp. 175–6) has observed, structured deposits in the Neolithic, for example, have not always been well-documented or recognized.
21. Compare these changes with a similar absence of monumentality at Mycenaean sites in the Middle Helladic period prior to the establishment of the Mycenaean palaces (e.g. Wright 1994: 56–7; Hitchcock and Chapin 2010).
22. Cassuto (2012: 469) refers to the loom weight deposit as eleventh to tenth century BCE, and it is noted that some may be of a rounded, more truncated conical form.
23. It also represents some of our earliest evidence for the construction of foundation trenches.
24. Diacritical feasting may be characterized as having differentiated cuisine, styles of consumption, and segmented social space through the use of architecture, which is used to reify and naturalize status differences (Dietler 2001: 85).
25. Wright (1994: 57–8) discusses a hearth-wanax ideology within the Mycenaean palaces whereby the king becomes the guardian of the hearth. The symbolism is

emphasized through the paraphernalia around the hearth and throne at Pylos such as the tripod table and miniature kylikes. More recently (Crielaard 2011) discusses the 'wanax to basileus' model, whereby the destruction of the palaces represented the decapitation of the Mycenaean socio-political hierarchy, but goes on to discuss how the changed socio-political and architectural landscape on the mainland was complex and varied, following different pathways.

26. Mycenaean and Philistine cooking jugs are characterized by one or two handles, a flat or ring base, and a mouth narrower than the widest part of the body (Yasur-Landau 2010: 126–32; also, papers in Karageorghis and Kouka 2011). The appearance of Mycenaean-style cooking jugs in Crete can be contrasted with the largely conservative Cretan preference for tripod cooking pots, which led Yasur-Landau (2010: 126–32, 329) to exclude Cretan presence or influence in Philistia. This argument now becomes untenable. Hallager and Hallager (2000: 159) make the point that without preserved bases it is difficult to distinguish Mycenaean-style cooking pots from tripod cooking pots.
27. Maran (2009: 253) observes that the social organization and ability to manipulate large stones disappeared with the collapse of palatial civilization. Thus, the construction of the ninth-century BCE buildings at Tell es-Safi/Gath suggests increasing social complexity and ability to harness resources on a grander scale than in the previous period (twelfth to tenth centuries). To invoke 'thick description,' the megalithic limestone blocks used to construct the ninth-century BCE walls are fairly enormous, with one of those still *in situ* from Wall A15AM09 measuring 40 cm in height with a maximum length of 1 m and a maximum width of 67 cm. Those parts of these walls that were dismantled were done so with great difficulty, requiring about six persons to carry them away. Attempts to break them up with a sledgehammer failed when the sledgehammer broke and we have had only limited success with a jackhammer, which simply failed to break the stone.
28. The top and bottom of the column base are unworked, but the top is flat. The sides are hammer-dressed to give it a rounded shape.
29. Wall 22040 extended north–south and was excavated prior to Hitchcock's involvement in the area.
30. The canonical Mycenaean megaron (see Hitchcock 2010; Barber 1992; Wright 1994) of the Late Bronze Age had a rectangular outline and consisted of a hall, fore-hall, and a porch with two columns in antis to support the roof. Both the fore-hall and the porch were approximately one-half the depth of the inner hall. The internal arrangement of the megaron was dominated by a circular hearth, and surrounded by four columns arranged in a square. The megaron frequently had rear chambers and side corridors giving access to smaller, square service rooms to the side. By the time of the postpalatial IIIC era in Greece, this plan becomes much simplified.
31. These were quite possibly influenced by earlier, small shrines, cult corners, publicly accessible palatial shrines, and peak sanctuaries (see Hitchcock 2011).
32. Remarks on the 'temple' are provisional as it was excavated by a different group of collaborators on the Tell es-Safi/Gath archaeological project.
33. At least one figurine was noted from fill substantially above the level of the floor in the Safi building, thus its connection to the building is not entirely convincing.

34. On the distinction between nuclear and extended families see Haviland et al. (2011: 229–30).
35. The following discussion is summarized from Gaignerot-Driessen and Letesson (2011); Gaignerot-Driessen (2011); and Letesson (2011). Gaignerot-Driessen (2012: 73) also mentions four spools in Quartier Nu and Driessen (Letesson pers. comm.) has noted some found in the topsoil layers above Quartier Mu, while six have been found in the pit deposits at LM IIIC Khamalevri (Andreadak-Vlasaki and Papadoulou 2005: 389, 392).
36. The column bases are on a central axis and placed 2.0 m apart. This 2 m distance is common in Philistine temples as well, where it has been fancifully linked to Samson's dislodging of the pillars in the Philistine temple at Gaza as described in Judges 16:29–30. Structural considerations are more convincing. Only the east base at Sissi, C29 is carefully worked and the excavators suggest it was reused, a phenomenon known from Maa. A stirrup jar below the base was a foundation deposit and two more foundation deposits are noted (Gaignerot-Driessen 2011: 93).
37. A triton shell and a vessel in the shape of a conch shell were also found at Tel Qasile and an endolium shell was found in a ritual context in the lower city at Tell es-Safi/Gath (Mazar 1980: 115–18, fig. 45, pl. 36.3; Hitchcock et al. 2016).
38. The bases were made of ammouda. In addition there was a column base that had fallen from above or was in reuse. Samples from the hearth, which contained ashes, flecks of charcoal, and bones are currently under analysis (Letesson 2011: 121, 123).
39. A similar argument is made for Quartier Nu, although status differentiation is also suggested as a plausible alternative (Driessen and Fiasse 2011: 291, 293).

REFERENCES

Aja, A. J. 2009. 'Philistine Domestic Architecture in the Iron Age I'. PhD dissertation. Harvard University.

Alexander, R. T. 1998. 'Afterword: Toward an Archaeological Theory of Culture Contact'. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick. Carbondale, IL: Southern Illinois University: 476–95.

Andreadaki-Vlazaki, M. and E. Papadopoulou. 2005. 'The Habitation at Khamalevri, Rethymnon, during the 12th Century BC'. In *Ariadne's Threads: Connections between Crete and the Greek Mainland in LM III (LM IIIA2 to LM IIIC)*, edited by A. L. D'Agata and J. Moody. Athens: Scuola Archeologica Italiana di Atene: 353–98.

Asscher, Y., D. Cabanes, L. A. Hitchcock, A. M. Maeir, S. Wiener, and E. Boaretto. 2015. 'Radiocarbon Dating Shows an Early Appearance of Philistine Cultural Material in Tell es-Safi/Gath, Philistia'. *Radiocarbon* 57.5: 825–50.

Bar-Ilan University. 2015. 'Archaeologists Uncover a Monumental City Gate and Fortification of the Biblical City of Philistine Gath (Home of Goliath)' (press release, 4 August 2015, accessed 20 November 2015, <http://www1.biu.ac.il/indexE.php?id=33&pt=20&pid=4&level=1&cPath=4& type=1&news=2460>).

Barber, R. L. N. 1992. 'The Origins of the Mycenaean Palace'. In *ΦΙΛΟΛΑΚΩΝ: Lakonian Studies in Honour of Hector Catling*, edited by J. M. Sanders. London: British School at Athens: 11–23.

Bretschneider, J., A. Kanta, and J. Driessen. 2015. 'Pyla-*Kokkinokremos*: Preliminary Report on the 2014 Excavations'. *Ugarit-Forschungen* 46: 1–37.

Briault, C. 2007. 'High Fidelity or Chinese Whispers? Cult Symbols and Ritual Transmission in the Bronze Age Aegean'. *Journal of Mediterranean Archaeology* 20.2: 239–65.

Brysbaert, A. 2007. 'Cross-Craft and Cross-Cultural Interactions during the Aegean and Eastern Mediterranean Late Bronze Age'. In *Mediterranean Crossroads*, edited by S. Antoniadou and A. Pace. Athens: Pierides Museum: 32–59.

Brysbaert, A. and M. Vetters. 2010. 'Practicing Identity: A Crafty Idea?'. *Mediterranean Archaeology and Archaeometry* 10.2: 25–43.

Burdajewicz, M. 1990. *The Aegean Sea Peoples and Religious Architecture in the Eastern Mediterranean at the Close of the Late Bronze Age*. Oxford: British Archaeological Reports.

Cassuto, D. 2012. 'Chapter 19: Weaving Implements'. In *Tell es-Safi/Gath I: Report on the 1996–2005 Seasons*, edited by A. M. Maeir. Wiesbaden: Harrassowitz: 467–84.

Christophilopoulou, A. 2008. 'Domestic Architecture, Spatial Organisation and the Use of Space in the Early Iron Age in Island Greece'. PhD thesis. University of Cambridge.

Cline, E. H. 2014. *1177 BC: The Year Civilization Collapsed*. Princeton, NJ: Princeton University Press.

Crielaard, J. P. 2011. 'The "Wanax to Basileus Model" Reconsidered: Authority and Ideology After the Collapse of the Mycenaean Palaces'. In *The 'Dark Ages' Revisited: Acts of an International Symposium in Memory of William D. E. Coulson, University Of Thessaly, Volos, 14–17 June 2007*, edited by A. Mazarakis Ainian. Volos: University of Thessaly Press: 83–111.

Cutler, J. 2016. 'Fashioning Identity: Weaving Technology, Dress and Cultural Change in the Middle and Late Bronze Age Southern Aegean'. In *Beyond Thalassocracies: Understanding the processes of Minoanisation and Mycenaeanisation in the Aegean*, edited by E. Gorogianni and P. Pavük. Oxford: Oxbow Press: 172–85.

D'Agata, A. L. 1997–2000. 'Ritual and Rubbish in Dark Age Crete: The Settlement of Thronos/Kephala (Ancient Sybrita) and the Pre-Classical Roots of a Greek City'. *Aegean Archaeology* 4: 45–59.

D'Agata, A. L. 2000. 'Religion, Society and Ethnicity on Crete at the End of the Late Bronze Age: The Contextual Framework of LM IIIC Cult Activities'. In *Potnia: Deities and Religion in the Aegean Bronze Age* (Aegaeum 22), edited by R. Laffineur and W.-D. Niemeier. Liège: University of Liège: 345–54.

Deger-Jalkotzy. S. 2008. 'Decline, Destruction, Aftermath'. In *The Cambridge Companion to the Aegean Bronze Age*, edited by C. Shelmerdine. Cambridge: Cambridge University Press: 387–415.

Demas, M. 1988. 'I. The Architectural Remains'. In *Excavations at Maa-Paleokastro, 1979–1986*, edited by V. Karageorghis and M. Demas. Nicosia: Department of Antiquities, Cyprus: 1–100.

Devolder, M. 2009. '7. The Excavation of Zone 5'. In *Excavations at Sissi I: Preliminary Report on the 2007–2008 Campaigns* (Aegis 1), by J. Driessen, I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, H. Fiasse, P. Hacigüzeller, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. Louvain-la-Neuve: Presses universitaires de Louvain: 139–56.

Devolder, M. 2011. '6. The Excavation of Zone 5'. In *Excavations at Sissi II: Preliminary Report on the 2009–2010 Campaigns* (Aegis 4), by J. Driessen, I. Schoep,

F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. Louvain-la-Neuve: Presses universitaires de Louvain: 143–62.

Devolder, M. 2012. '5. The excavation of the open area north of Building E in Zone 5'. In *Excavations at Sissi III: Preliminary Report on the 2011 Campaign* (Aegis 6), by J. Driessen, I. Schoep, M. Anastasiadou, F. Carpentier, I. Crevecoeur, S. Déderix, M. Devolder, F. Gaignerot-Driessen, S. Jusseret, C. Langohr, Q. Letesson, F. Liard, A. Schmitt, C. Tsoraki, and R. Veropoulidou. Louvain: Presses universitaires de Louvain: 69–79.

Dietler, M. 2001. 'Theorizing the Feast: Rituals of Consumption, Commensal Politics, and Power in African Contexts'. In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by M. Dietler and B. Hayden. Washington, DC: Smithsonian Institution Press: 65–114.

Dikaios, P. 1969. *Enkomi, Excavations 1948–58*, Vol. I: *The Architectural Remains, the Tombs*. Mainz am Rhein: Philipp von Zabern.

Dothan, T. 1998. 'Initial Philistine Settlement: From Migration to Coexistence'. In *Mediterranean Peoples Transition: Thirteenth to Early Tenth Centuries BCE. In Honor of Professor Trude Dothan*, edited by S. Gitin, A. Mazar, and E. Stern. Jerusalem: Israel Exploration Society: 148–61.

Dothan, T. 2003. 'The Aegean and the Orient: Cultic Interactions'. In *Symbiosis, Symbolism, and the Power of the Past: Canaan, Ancient Israel, and Their Neighbors from the Late Bronze Age through Roman Palestina*, edited by W. G. Dever and S. Gitin. Winona Lake, IN: Eisenbrauns: 189–214.

Dothan, T. and M. Dothan. 1992. *People of the Sea: The Search for the Philistines*. New York: Scribner.

Dothan, T., Y. Garfinkel, and S. Gitin. 2016. 'Chapter 2. Occupational History: The Stratigraphy and Architecture of Middle Bronze Age II Stratum XI and Iron Age Strata VII–IV'. In *Tel Miqne-Ekron Field IV Lower: The Elite Zone, The Iron Age I and IIC, The Early and Late Philistine Cities*, by T. Dothan, Y. Garfinkel, and S. Gitin. Studies in the Archaeology and History of the Levant. Cambridge, MA: Harvard Semitic Museum.

Driessen, J. and A. Farnoux. 1994. 'Mycenaeans at Mallia'. *Aegean Archaeology* 1: 54–64.

Driessen, J., A. Farnoux, and C. Langohr. 2008a. 'Favissae: Feasting Pits in LM III'. In *DAIS: The Aegean Feast* (Aegaeum 29), edited by L. A. Hitchcock, R. Laffineur, and J. Crowley. Liège: University of Liège: 197–206.

Driessen, J. and H. Fiasse. 2011. '"Burning Down the House": Defining the Household of Quartier Nu at Malia Using GIS'. In *Στέγα. The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 285–96.

Driessen, J., H. Fiasse, M. Devolder, P. Hacigüzeller, and Q. Letesson. 2008b. 'Recherches spatiales au Quartier Nu à Malia (MR III)'. *Creta Antica* 9: 93–110.

Eliopoulos, T. 1998. 'A Preliminary Report on the Discovery of Temple Complex of the Dark Ages at Kephala Vasilikis'. In *Eastern Mediterranean: Cyprus-Dodecanese-Crete, 16th–6th cent. B.C.*, edited by V. Karageorghis and N. C. Stampolidis. Athens: University of Crete and A. G. Leventis Foundation: 301–13.

Eliopoulos, T. 2003. 'The LM III "Omphalos" Altar at Kephalla Vasilikis'. In *Argonautes: Christos Doumas Festscrhift*, edited by A. Vlachapoulos and K. Birtaxa. Athens: Kathimerini: 389–408.

Eliopoulos, T. 2004. 'Gournia, Vronda Kavousi, Kephala Vasilikis: A Triad of Interrelated Shrines of the Expiring Minoan Age on the Isthmus of Ierapetra'. In *Crete Beyond the Palaces: Proceedings of the Crete 2000 Conference*, edited by L. P. Day, M. S. Mook, and J. D. Muhly. Philadelphia, PA: INSTAP Academic Press: 81–90.

Eliyahu-Behar, A., N. Yahalom-Mack, S. Shilstein, A. Zukerman, C. Shafer-Elliott, A. M. Maeir, E. Boaretto, I. Finkelstein, and S. Weiner. 2012. 'Iron and Bronze Production in Iron Age IIA Philistia: New Evidence from Tell es-Safi/Gath, Israel'. *Journal of Archaeological Science* 39: 255–67.

Emanuel, J. P. 2014. 'Sea Peoples, Egypt and the Aegean: The Transference of Maritime Technology in the Late Bronze–Early Iron Transition (LH IIIB–C)'. *Aegean Studies* 1: 21–56.

Evely, D. 1992. 'Towards an Elucidation of the Ivory-Worker's Took Kit in Neopalatial Crete'. In *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. London: British Museum Publications: 7–16.

Feldman, M. H. 2014. *Communities of Style: Portable Luxury Arts, Identity and Collective Memory in the Iron Age Levant*. Chicago: University of Chicago.

Frankel, D. and J. M. Webb. 2012. 'Household Continuity and Transformation in a Prehistoric Cypriot Village'. In *New Perspectives in Household Archaeology*, edited by B. J. Parker and C. P. Foster. Winona Lake, IN: Eisenbrauns: 473–500.

Frizell, B. S. 1997–8. 'Monumental Building at Mycenae: Its Function and Significance'. *Opuscula Atheniensia* 22–3: 103–16.

Gaignerot-Driessen, F. 2011. '5. The Excavation of Building CD: 5.2. The Excavation of Zone 3'. In *Excavations at Sissi II: Preliminary Report on the 2009–2010 Campaigns* (Aegis 4), by J. Driessen, I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. Louvain-la-Neuve: Presses universitaires de Louvain: 89–101.

Gaignerot-Driessen, F. 2012. '4.2 The Excavation of Zone 3'. In *Excavations at Sissi III: Preliminary Report on the 2011 Campaign* (Aegis 6), by J. Driessen, I. Schoep, M. Anastasiadou, F. Carpentier, I. Crevecoeur, S. Déderix, M. Devolder, F. Gaignerot-Driessen, S. Jusseret, C. Langohr, Q. Letesson, F. Liard, A. Schmitt, C. Tsoraki, and R. Veropoulidou. Louvain: Presses universitaires de Louvain: 69–79.

Gaignerot-Driessen, F. and Q. Letesson. 2011. '5. The Excavation of Building CD: 5.1. Introduction'. In *Excavations at Sissi II: Preliminary Report on the 2009–2010 Campaigns* (Aegis 4), by J. Driessen, I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. Louvain-la-Neuve: Presses universitaires de Louvain: 83–8.

Gilan, A. 2013. 'Pirates in the Mediterranean—A View from the Bronze Age'. *Mittelmeerstudien* 3: 49–66.

Georgiou, A. 2014. 'Appendix III. The "Canaanite Jars"'. In *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*, edited by V. Karageorghis and A. Kanta. Uppsala: Paul Åströms Förlag: 175–87.

Haggis, D. 2013. 'Destruction and the Formation of Static and Dynamic Settlement Structures'. In *Destruction: Archaeological, Philological, and Historical Perspectives*, edited by J. Driessen. Louvain-la-Neuve: Presses universitaires de Louvain: 1–18.

Hallager, E. and B. P. Hallager. 2000. *The Greek-Swedish Excavations at the Agia Aikaterini Square Kastelli, Khania 1970–1987*. Vol. II: *The Late Minoan IIIC Settlement*. Stockholm: Paul Åströms Förlag.

Hallager, E. and B. P. Hallager. 2003. *The Greek–Swedish Excavations at the Agia Aikaterini Square Kastelli, Khania 1970–1987 and 2001*. Vol. III.1–2: *The Late Minoan IIIB2 Settlement*. Stockholm: Paul Åströms Förlag.

Hamilakis, Y. 2008. 'Time, Performance, and the Production of a Mnemonic Record: From Feasting to an Archaeology of Eating and Drinking'. In *DAIS: The Aegean Feast* (Aegaeum 29), edited by L. A. Hitchcock, R. Laffineur, and J. Crowley. Liège: University of Liège: 3–20.

Hamilakis, Y. 2013. *Archaeology and the Senses: Human Experience, Memory, and Affect*. Cambridge: Cambridge University Press.

Haviland, W. A., H. E. L. Prins, B. McBride, and D. Walrath. 2011. *Cultural Anthropology: The Human Challenge*. 13th edn. Belmont, CA: Wadsworth.

Hayden, B. J. 1981. 'The Development of Architecture from the Late Minoan IIIA through the Geometric Periods'. PhD dissertation. University of Pennsylvania.

Hitchcock, L. A. 2002. 'Levantine Horned Altars: An Aegean Perspective on the Transformation of Socio-Religious Reproduction'. In *'Imagining' Biblical Worlds: Spatial, Social, and Historical Constructs: Essays in Honour of James W. Flanagan*, edited by P. M. McNutt and D. M. Gunn. London: Sheffield Academic Press: 223–39.

Hitchcock, L. A. 2005. '"Who Will Personally Invite a Foreigner, Unless He is a Craftsman?": Exploring Interconnections in Aegean and Levantine Architecture'. In *EMPORIA: Aegeans in the Central and Eastern Mediterranean* (Aegaeum 25), edited by R. Laffineur and E. Greco. Liège: University of Liège: 691–9.

Hitchcock, L. A. 2008a. '"Do you see a man skillful in his work? He will stand before kings": Interpreting Architectural Influences in the Bronze Age Mediterranean'. *Ancient West and East* 7: 17–48.

Hitchcock, L. A. 2008b. 'Architectures of Feasting'. In *DAIS: The Aegean Feast. Proceedings of the 12th International Aegean Conference University of Melbourne* (Aegaeum 29), edited by L. A. Hitchcock, R. Laffineur, and J. Crowley. Liège: University of Liège: 317–26.

Hitchcock, L. A. 2010. 'Architecture, Mycenaean'. In *The Oxford Handbook of the Bronze Age Aegean (3000–1000 BCE)*, edited by E. H. Cline. Oxford: Oxford University Press: 200–9.

Hitchcock, L. A. 2011. 'Fluid and Flexible: Revisiting the Vernacular Tradition in Bronze Age Crete and Cyprus'. In *Στέγα. The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 233–45.

Hitchcock, L. A. 2012. 'Dressed to Impress: Architectural Adornment as an Exotic Marker of Elite Identity in the Eastern Mediterranean'. In *KOSMOS: Jewelry, Adornment and Textiles in the Aegean Bronze Age* (Aegaeum 33), edited by M. L. Nosch and R. Laffineur. Leuven: Peeters: 663–71.

Hitchcock, L. A. and A. P. Chapin. 2010. 'Lacuna in Laconia: Why were there No Middle Helladic Palaces?'. In *Mesohelladika*, edited by G. Touchais, A. Phillippa-Touchais, S. Voutsaki, and J. Wright. Athens: École française d'Athènes: 817–22.

Hitchcock, L. A., A. P. Chapin, E. Banou, and J. Reynolds. 2016. 'The Conglomerate Quarry at the Mycenaean Site of Vapheio-Palaiopyrgi in Laconia'. *Hesperia* 85.1: 65–90.

Hitchcock, L. A., L. K. Horwitz, E. Boaretto, and A. M. Maeir. 2015. 'One Philistine's Trash is an Archaeologist's Treasure'. *Near Eastern Archaeology* 78.1: 12–25.

Hitchcock, L. A. and A. M. Maeir. 2013. ‘Beyond Creolization and Hybridity: Entangled and Transcultural Identities in Philistia’. *Archaeological Review from Cambridge* 28.1: 51–72.

Hitchcock, L. A. and A. M. Maeir. 2014. ‘Yo Ho, Yo Ho, A Seren’s Life for Me’. *World Archaeology* 46.4: 624–40.

Hitchcock, L. A. and A. M. Maeir. 2016. ‘Pulp Fiction: The Sea Peoples and the Study of “Mycenaean” Archaeology in Philistia’. In *Ra-Pi-Ne-U: Studies on the Mycenaean World Offered to Robert Laffineur for his 70th Birthday* (Aegis 10), edited by J. Driessen. Louvain-la-Neuve: Presses universitaires de Louvain: 145–56.

Hitchcock, L. A. and A. M. Maeir. 2017. ‘Fifteen Men on a Dead Seren’s Chest: Yo Ho Ho and a Krater of Wine’. In *Context and Connection: Essays on the Archaeology of the Ancient Near East in Honour of Antonio Sagona*, edited by A. Batmaz, G. Bedianashvili, A. Michalewicz, and A. Robinson. Leuven: Peeters: 147–59.

Hitchcock, L. A., A. M. Maeir, and A. Dagan. 2016. ‘The Entanglement of Aegean Style Ritual Actions in Philistine Culture’. In *METAPHYSIS: Ritual, Myth and Symbolism in the Aegean Bronze Age* (Aegaeum 39), edited by E. Alram-Stern, F. Blakolmer, S. Deger-Jalkotzy, R. Laffineur, and J. Weilhartner. Leuven: Peeters: 519–26.

Iacovou, M. 2008. ‘Cultural and Political Configurations in Iron Age Cyprus: The Sequel to a Protohistoric Episode’. *American Journal of Archaeology* 112.4: 625–58.

Kanta, A. 2014a. ‘Pyla-Kokkinokremos 2012’. In *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*, edited by V. Karageorghis and A. Kanta. Uppsala: Paul Åströms Förlag: 103–12.

Kanta, A. 2014b. ‘The Site and Architecture of Pyla in Their Historical Setting’. In *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*, edited by V. Karageorghis and A. Kanta. Uppsala: Paul Åströms Förlag: 1–102.

Kanta, A. 2014c. ‘Pyla-Kokkinokremos 2010, 2011: The Excavation and Architecture’. In *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*, edited by V. Karageorghis and A. Kanta. Uppsala: Paul Åströms Förlag: 113–21.

Karageorghis, V. 1998. ‘Hearths and Bathtubs in Cyprus: A “Sea Peoples” Innovation?’. In *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE: In Honor of Professor Trude Dothan*, edited by S. Gitin, A. Mazar, and E. Stern. Jerusalem: Israel Exploration Society: 276–82.

Karageorghis, V. 2000. ‘Cultural Innovations in Cyprus Relating to the “Sea Peoples” ’. In *The Sea Peoples and Their World: A Reassessment*, edited by E. D. Oren. Philadelphia, PA: University Museum, University of Pennsylvania: 249–73.

Karageorghis, V. 2002. *Early Cyprus: Crossroads of the Mediterranean*. Los Angeles: Getty Centre Publications.

Karageorghis, V. 2011a. ‘What Happened in Cyprus c. 1200 BC: Hybridization, Creolization or Immigration? An Introduction’. In *On Cooking Pots, Drinking Cups, Loomweights and Ethnicity in Bronze Age Cyprus and Neighbouring Regions*, edited by V. Karageorghis and O. Kouka. Nicosia: A. G. Leventis Foundation: 19–28.

Karageorghis, V. 2011b. ‘Handmade Burnished Ware in Cyprus and Elsewhere in the Eastern Mediterranean’. In *On Cooking Pots, Drinking Cups, Loomweights and Ethnicity in Bronze Age Cyprus and Neighbouring Regions*, edited by V. Karageorghis and O. Kouka. Nicosia: A. G. Leventis Foundation: 87–94.

Karageorghis, V. 2014. ‘Summary and Historical Conclusions’. *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*, edited by V. Karageorghis and A. Kanta. Uppsala: Paul Åströms Förlag: 155–62.

Karageorghis, V. and M. Demas. 1984. *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus*. Nicosia: Department of Antiquities.

Karageorghis, V. and M. Demas. 1985. *Excavations at Kition V: The Pre-Phoenician Levels, Areas I and II, Part I*. Nicosia: Department of Antiquities.

Karageorghis, V. and A. Georgiou. 2012. ‘A Corpus of Late Minoan III Pottery from Pyla-Kokkinokremos’. *Report of the Department of Antiquities, Cyprus* 2010: 301–24.

Karageorghis, V. and A. Kanta (eds). 2014. *Pyla-Kokkinokremos: A Late 13th Century BC Fortified Settlement in Cyprus: Excavations 2010–2011*. Uppsala: Paul Åströms Förlag.

Karageorghis, V. and O. Kouka (eds). 2011. *On Cooking Pots, Drinking Cups, Loomweights and Ethnicity in Bronze Age Cyprus and Neighbouring Regions*. Nicosia: A. G. Leventis Foundation.

Klein, N., and K. Glowacki. 2009. ‘Chapter 13: From Kavousi to Vronda to Dreros: Architecture and Display in Cretan Cult Buildings’. In *Archaeologies of Cult: Essays on Ritual and Cult in Crete in Honor of Geraldine C. Gesell*, edited by A. L. D’Agata and A. Van de Moortel. Princeton, NJ: American School of Classical Studies at Athens: 153–67.

Knapp, A. B. 1986. *Copper Production and Divine Protection: Archaeology, Ideology, and Social Complexity on Bronze Age Cyprus*. Göteborg: Paul Åströms Förlag.

Knapp, A. B. 2008. *Prehistoric and Protohistoric Cyprus: Identity, Insularity and Connectivity*. Oxford: Oxford University Press.

Knapp, A. B. and S. W. Manning. 2016. ‘Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean’. *American Journal of Archaeology* 120.1: 99–149.

Letesson, Q. 2011. ‘5. The Excavation of Building CD: 5.2. The Excavation of Zone 4’. In *Excavations at Sissi II: Preliminary Report on the 2009–2010 Campaigns* (Aegis 4), by J. Driessen, I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. Louvain-la-Neuve: Presses universitaires de Louvain: 103–41.

Letesson, Q. 2015. ‘Fire and the Holes: An Investigation of Low-Level Meanings in the Minoan Built Environment’. *Journal of Archaeological Method and Theory* 22.3: 713–50.

Maeir, A. M. 2012. ‘Chapter 1: The Tell es-Safi/Gath Archaeological Project 1996–2010: Introduction, Overview and Synopsis of Results’. In *Tell es-Safi/Gath I: Report on the 1996–2005 Seasons*, edited by A. M. Maeir. Wiesbaden: Harrassowitz: 1–88.

Maeir, A. M., B. Davis, L. K. Horwitz, Y. Asscher, and L. A. Hitchcock. 2015. ‘An Ivory Bowl from Early Iron Age Tell es-Safi/Gath (Israel)—Manufacture, Meaning and Memory’. *World Archaeology* 47.3: 413–38.

Maeir, A. M. and L. A. Hitchcock. 2011. ‘Absence Makes the Hearth Grow Fonder: Searching for the Origins of the Philistine Hearth’. *Eretz Israel* 30: 46–64.

Maeir, A. M., L. A. Hitchcock, and L. K. Horwitz. 2013. ‘On the Constitution and Transformation of Philistine Identity’. *Oxford Journal of Archaeology* 32.1: 1–38.

Maran, J. 2000. ‘Political and Religious Aspects of Architectural Change on the Upper Citadel of Tiryns: The Case of Building T’. In *Potnia: Deities and Religion in the*

Aegean Bronze Age (Aegaeum 22), edited by R. Laffineur and W.-D. Niemeier. Liège: University of Liège: 113–22.

Maran, J. 2006. 'Coming to Terms with the Past: Ideology and Power in Late Helladic IIIC'. In *Ancient Greece: From the Mycenaean Palaces to the Age of Homer*, edited by S. Deger-Jalkotzy and I. S. Lemos. Edinburgh: Edinburgh University Press: 123–50.

Maran, J. 2009. 'The Crisis Years? Reflections on Signs of Instability in the Last Decades of the Mycenaean Palaces'. *Scienze dell'Antichità Storia Archeologia Antropologia* 15: 241–62.

Master, D. M. and A. J. Aja. 2011. 'The House Shrine of Ashkelon'. *Israel Exploration Journal* 61.2: 129–45.

Mazar, A. 1980. *Excavations at Tell Qasile, Part One: The Philistine Sanctuary—Architecture and Cult Objects*. Jerusalem: Hebrew University.

Mazow, L. 2005. 'Competing Material Culture: Philistine Settlement at Tel Miqne-Ekron in the Early Iron Age'. PhD dissertation. University of Arizona.

McEnroe, J. 1982. 'A Typology of Minoan Neopalatial Houses'. *American Journal of Archaeology* 86: 1–9.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Moak, M. 2000. 'The Palaikastro Kouros'. In *The Palaikastro Kouros: A Minoan Chryselephantine Statuette and its Aegean Bronze Age Context*, edited by J. A. MacGillivray, L. H. Sackett, and J. Driessen. Athens: British School at Athens: 65–83.

Mylonas, G. 1962. 'H. The Periboloi of the Acropolis of Mycenae'. *Ephēmeris archaiologikē* 1962: 167–85, 197–8.

Nowicki, K. 1999. 'Economy of Refugees: Life in the Cretan Mountains at the Turn of the Bronze and Iron Ages'. In *From Minoan Farmers to Roman Traders: Sidelights on the Economy of Ancient Crete*, edited by A. Chaniotis. Stuttgart: Franz Steiner: 145–71.

Papazoglou-Manoudaki, L. and K. Paschalidis. Forthcoming. 'A Society of Merchants and Warriors to the East of the West: The Case of the Mycenaean Settlement on Mygdalia Hill, Near Patras, in Achaea'. In *HESPEROS: The Aegean Seen From the West*, edited by M. Fotiadis, R. Laffineur, Y. Lolos, and A. Vlachopoulos. Leuven: Peeters.

Platon, N. 1971. *Zakros: The Discovery of a Lost Palace of Ancient Crete*. New York: Charles Scribner's Sons.

Prent, M. 2003. 'Glories of the Past in the Past: Ritual Activities at Palatial Ruins in Early Iron Age Crete'. In *Archaeologies of Memory*, edited by R. M. van Dyke and S. E. Alcock. Oxford: Blackwell: 81–103.

Prent, M. 2004. 'Cult Activities at the Palace of Knossos from the End of the Bronze Age: Continuity and Change'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 411–19.

Prent, M. 2005. *Cretan Sanctuaries and Cults: Continuity and Change from Late Minoan IIIC to the Archaic Period*. Leiden: Brill.

Preziosi, D. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: Mouton.

Privitera, S. 2015. *Haghia Triada III: The Late Minoan Buildings in the Villaggio*. Athens: National and Kapodistrian University of Athens and Italian Archaeological School at Athens.

Renfrew, C. 1985. *The Archaeology of Cult: The Sanctuary at Phylakopi*. London: Thames and Hudson.

Rogasch, J. 2015. 'Building Societies on the Way to Early Complexity: Re-Evaluating Late Neolithic and Early Chalcolithic Architecture in Central Anatolia and the Lake District' (presented paper, Australian Archaeology Association Annual Meeting, Fremantle, Australia, 2–4 December 2015).

Rupp, D. W. 2014. 'Foretelling the Future: Innovative Elements in Settlement Planning and Building Types at Late Minoan IIIC Halasmenos (Monastiraki—Ierapetra, Crete)'. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 161–91.

Shaw, J. W. 2013. 'Architectural Signposts: Datable Ashlar Style at Middle Minoan III Kommos in South-Central Crete'. In *Intermezzo: Intermediacy and Regeneration in Middle Minoan III Palatial Crete*, edited by C. Macdonald and C. Knappett. London: British School at Athens: 137–43.

Sherratt, E. S. 1998. '"Sea Peoples" and the Economic Structure of the Late Second Millennium in the Eastern Mediterranean'. In *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE: In Honor of Professor Trude Dothan*, edited by S. Gitin, A. Mazar, and E. Stern. Jerusalem: Israel Exploration Society: 292–313.

Silverman, E. K. 1990. 'Clifford Geertz: Towards a More "Thick" Understanding?'. In *Reading Material Culture*, edited by C. Tilley. Oxford: Basil Blackwell: 121–59.

Stager, L. E., J. D. Schloen, D. M. Master, M. D. Press, and A. Aja. 2008. 'Part Four: Stratigraphic Overview'. In *Ashkelon 1: Introduction and Overview (1985–2006)*, edited by L. E. Stager, J. D. Schloen, and D. M. Master. Winona Lake, IN: Harvard Semitic Museum Publications, Final Reports of the Leon Levy Expedition to Ashkelon: 212–323.

Stockhammer, P. W. 2009. 'The Change of Pottery's Social Meaning at the End of The Bronze Age: New Evidence from Tiryns'. In *Forces of Transformation: The End of the Bronze Age in the Mediterranean*, edited by C. Bachhuber and R. G. Roberts. Oxford: Oxbow Books: 164–9.

Stockhammer, P. W. 2012a. 'Conceptualizing Cultural Hybridization in Archaeology'. In *Conceptualizing Cultural Hybridization: A Transdisciplinary Approach,* edited by P. W. Stockhammer. Heidelberg: Springer: 43–58.

Stockhammer, P. W. 2012b. 'Performing the Practice Turn in Archaeology'. *Transcultural Studies* 1: 6–39.

Szanton, N. 2017. 'Ninth Century BCE Pottery from Tell es-Safi/Gath (Stratum A3), 2006–2012 Seasons: Expanded Typology and Spatial Distribution' (In Hebrew with English summary). Master's thesis. Ramat-Gan: Bar-Ilan University.

Tomkins, P. 2007. 'Communality and Competition: The Social Life of Food and Containers at Aceramic and Neolithic Knossos, Crete'. In *Cooking up the Past: Food and Culinary Practices in the Neolithic and Bronze Age Aegean*, edited by C. Mee and J. Renard. Oxford: Oxbow Books: 174–99.

Tomkins, P. 2013. 'Making, Mending and Breaking: Contextualising and Interpreting the Intentional Destruction (and Curation) of Houses at Neolithic Knossos, Crete' (presented paper, International Round Table 'Destruction: Archaeological, Philological and Historical Perspectives' organized by the Centre for the Study of Ancient

Worlds (CEMA), Université Catholique de Louvain, Louvain-la-Neuve, Belgium, 24–26 November 2013).

Tournavitou, I. 1995. *The 'Ivory Houses' at Mycenae*. London: British School at Athens.

Tsipopoulou, M. 2005. '"Mycenoans" at the Isthmus of Ierapetra: Some (Preliminary) Thoughts on the Foundation of the (Eteo)cretan Cultural Identity'. In *Ariadne's Threads: Connections between Crete and the Greek Mainland in LM III (LM IIIA2 to LM IIIC)*, edited by A. L. D'Agata and J. Moody. Athens: Scuola archeologica italiana di Atene: 303–33.

Tsipopoulou, M. 2012. 'The Pre-Palatial–Early Protopalatial Cemetery at Petras, Siteia: A Diachronic Symbol of Social Coherence'. In *Petras, Siteia: 25 years of Excavations and Studies*, edited by M. Tsipopoulou. Oxford: Oxbow Books: 117–31.

Wace, A. J. B. 1949. *Mycenae: An Archaeological History and Guide*. Princeton, NJ: University Press.

Wace, A. J. B., W. A. Heurtley, W. Lamb, L. B. Holland, and C. A. Boethius. 1921–3. 'The Report of the School Excavations at Mycenae, 1920–1923'. *Annual of the British School at Athens* 25: 1–434.

Walberg, G. 1995. 'The Midea Megaron and Changes in Mycenaean Ideology'. *Aegean Archaeology* 2: 87–91.

Wallace, S. 2005. 'Last Chance to See? Karfi (Crete) in the Twenty-First Century: Presentation of New Architectural Data and Their Analysis in the Current Context of Research'. *Annual of the British School at Athens* 100: 215–74.

Wallace, S. 2011. 'Tradition, Status Competition, and the Templates of Domestic and Special Buildings in Post-Collapse Crete'. In *Στέγα. The Archaeology of Houses and Households in Ancient Crete*, edited by K. T. Glowacki and N. Vogeikoff-Brogan. Princeton, NJ: American School of Classical Studies at Athens: 323–32.

Webb, J. M. 1999. *Ritual Architecture, Iconography and Practice in the Late Cypriot Bronze Age*. Jonsered: Paul Åströms Förlag.

Wedde, M. 2006. 'Pictorial Evidence for Partial System Survival in the Greek Bronze to Iron Age Transition'. In *Pictorial Pursuits: Figurative Painting on Mycenaean and Geometric Pottery*, edited by E. Rystedt and B. Wells. Stockholm: Paul Åströms Förlag: 255–69.

Whittaker, H. 1997. *Mycenaean Cult Buildings: A Study of their Architecture and Function in the Context of the Aegean and the Eastern Mediterranean*. Bergen: Norwegian Institute at Athens.

Wright, J. C. 1994. 'The Spatial Configuration of Belief: The Archaeology of Mycenaean Religion'. In *Placing the Gods*, edited by S. Alcock and R. Osborne. Oxford: Oxford University Press: 37–78.

Wright, J. C. 2009. 'The Social Production of Space and the Architectural Reproduction of Society in the Bronze Age Aegean during the 2nd Millennium B.C.E.'. In *Constructing Power: Architecture, Ideology and Social Practice*, edited by J. Maran, C. Juwig, H. Schwengel, and U. Thaler. Berlin: Lit Verlag: 49–69.

Yasur-Landau, A. 2010. *The Philistines and Aegean Migration at the End of the Late Bronze Age*. Cambridge: Cambridge University Press.

Zukerman, A., L. K. Horwitz, J. E. Lev-Tov, and A. M. Maeir. 2007. 'A Bone of Contention? Iron Age IIA Notched Scapulae from Tell es-Safi/Gath, Israel'. *Bulletin of the American Schools of Oriental Research* 347: 57–81.

14

Dining on the Fringe? A Possible Minoan-Style Banquet Hall at Ayia Irini, Kea and the Minoanization of the Aegean Islands

Rodney D. Fitzsimons and Evi Gorogianni

14.1. INTRODUCTION

Since its excavation by John Caskey and the University of Cincinnati from 1960 to 1976, Ayia Irini has served as one of the principal catalysts for investigations into the spread of Minoan culture throughout the Aegean in the later Middle and early Late Bronze Age (Fig. 14.1).[1] Indeed, the abundance, concentration, and range of ceramic, architectural, iconographic, technological, and administrative evidence at the site that was inspired by, adapted, and/or adopted from the Cretan cultural package suggests that it functioned as one of the key nodes in the complex web of exchange networks that facilitated the dissemination of non-local traits across the region throughout this period (Fig. 14.2) (Abell 2014; Berg 2006, 2007; Davis 1979; Davis and Gorogianni 2008; Dietz 1998; Graziadio 1998; Knappett and Nikolakopoulou 2005; Knappett, Evans, and Rivers 2008; Knappett 2011; Nikolakopoulou 2007; Papagiannopoulou 1991; Schofield 1982a, 1982b, 1983, 1984a).

Despite the quantity, quality, and variety of such evidence at Ayia Irini, however, only a single structure in the settlement, House A, has been hitherto recognized as betraying any indication of Minoan architectural influence (Fig. 14.3) (e.g. Berg 2007: 114; Cummer 1980; Cummer and Schofield 1984; Hitchcock 1998: 173; Letesson 2009: 298–303; Whitelaw 2005: 56).[2] Currently located in the south-east quadrant of the site, though originally probably closer to its centre if changes in sea level are taken into account (Caskey 1962: 266, 278; 1964: 321; 1966: 365; 1971: 362), House A underwent a series of remodellings over the course of the Late Minoan IA through LM II periods (Cummer and Schofield 1984: 30–5; or Periods VI and VII in Caskey's local pottery terminology), the end result of which produced an interesting blend of

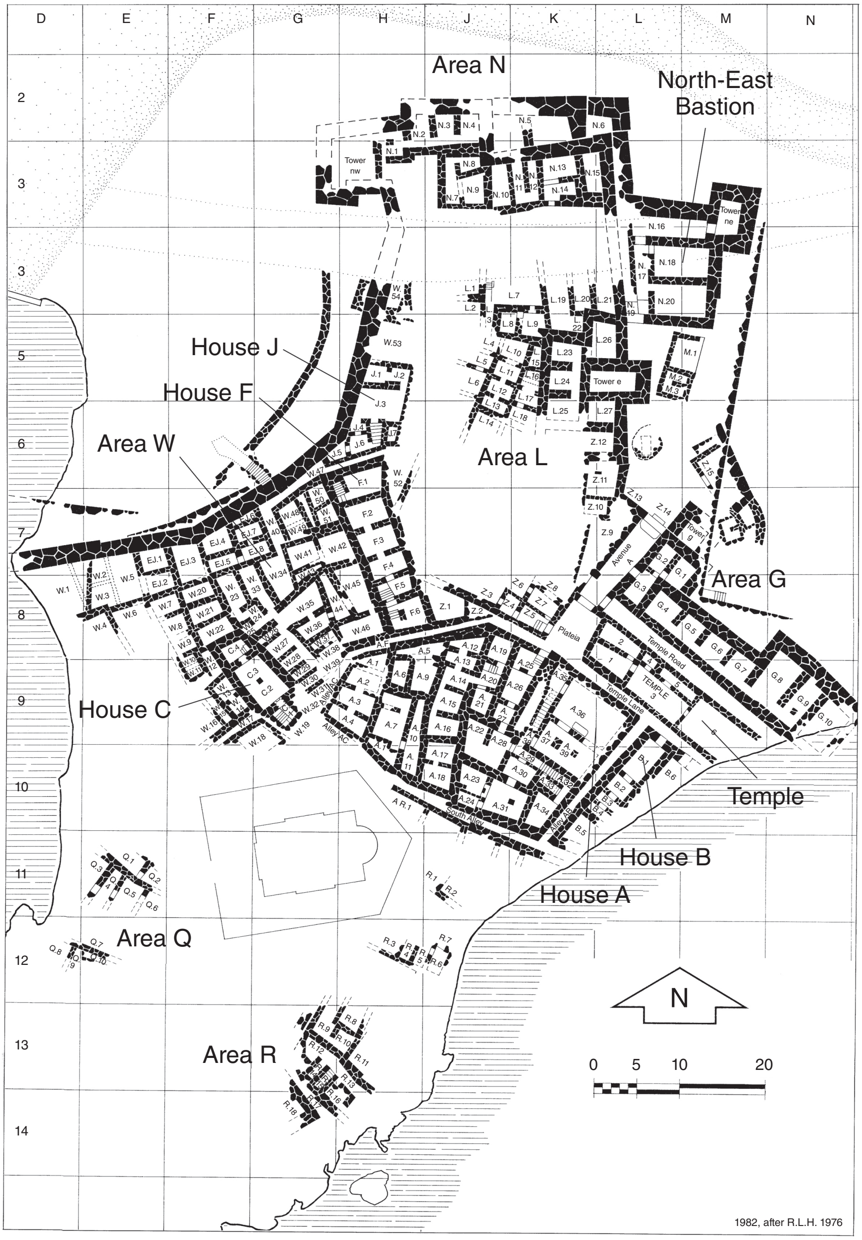

Fig. 14.1. Plan of Ayia Irini (after Cummer and Schofield 1984: pl. 3, drawn by R. L. Holzen; courtesy of the University of Cincinnati).

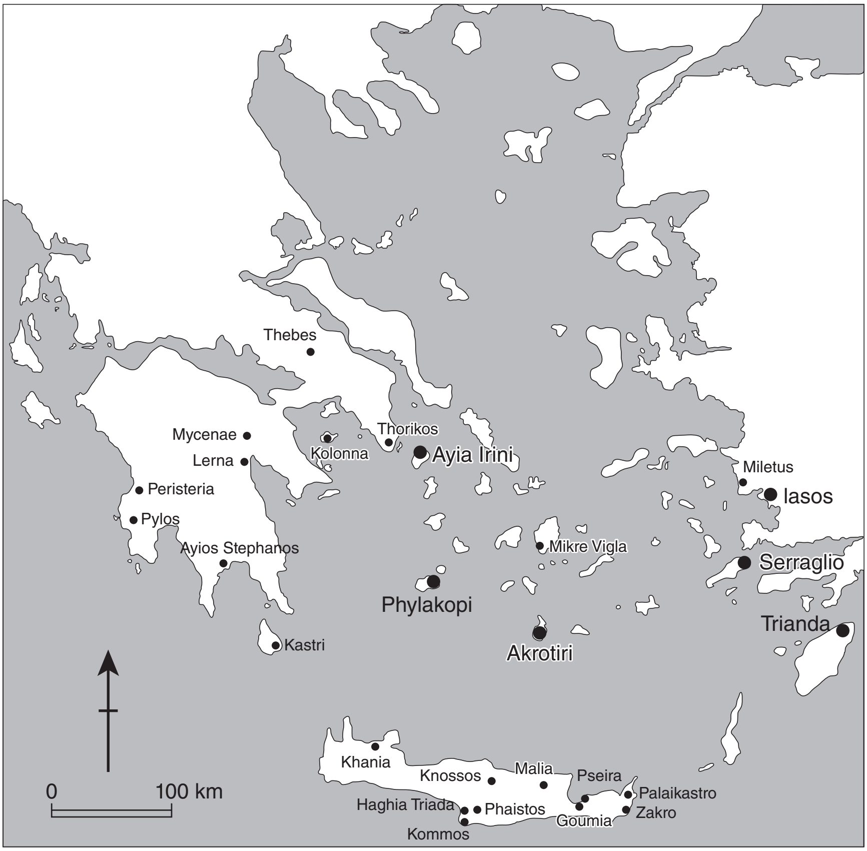

Fig. 14.2. Map of the Aegean, showing sites mentioned in this chapter (adapted by R. D. Fitzsimons from Dickinson 1994: fig. 4.10).

local and Minoanizing features. The latter, though perhaps sometimes overemphasized in the scholarly literature,[3] are evidenced in the eastern reaches of the complex, where the primary social and ritual rooms were housed, and are most notable in the inclusion of specific room types and design features, such as the modified light well with its associated windows in Room A.23 (Cummer and Schofield 1984: 18, 32, 36–7, and 41), the so-called pillar crypt in basement Room A.31 (Cummer and Schofield 1984: 15–16, 35, and 36), the switch-back staircase with *sottoscala* in A.32 and A.35 (Cummer and Schofield 1984: 6, 17, 36), and the pseudo-pier-and-door partition in the south wall of Court A.36.[4] Further possible Minoan traits can be seen, for example, in the presence of richly coloured wall paintings (Abramovitz 1980: 77, 78–82, 84–5; Caskey 1966: 374; Coleman 1973: 286–93); in the use of slab pavements with red plaster in the interstices (Hitchcock 1998: 172); and in the overall

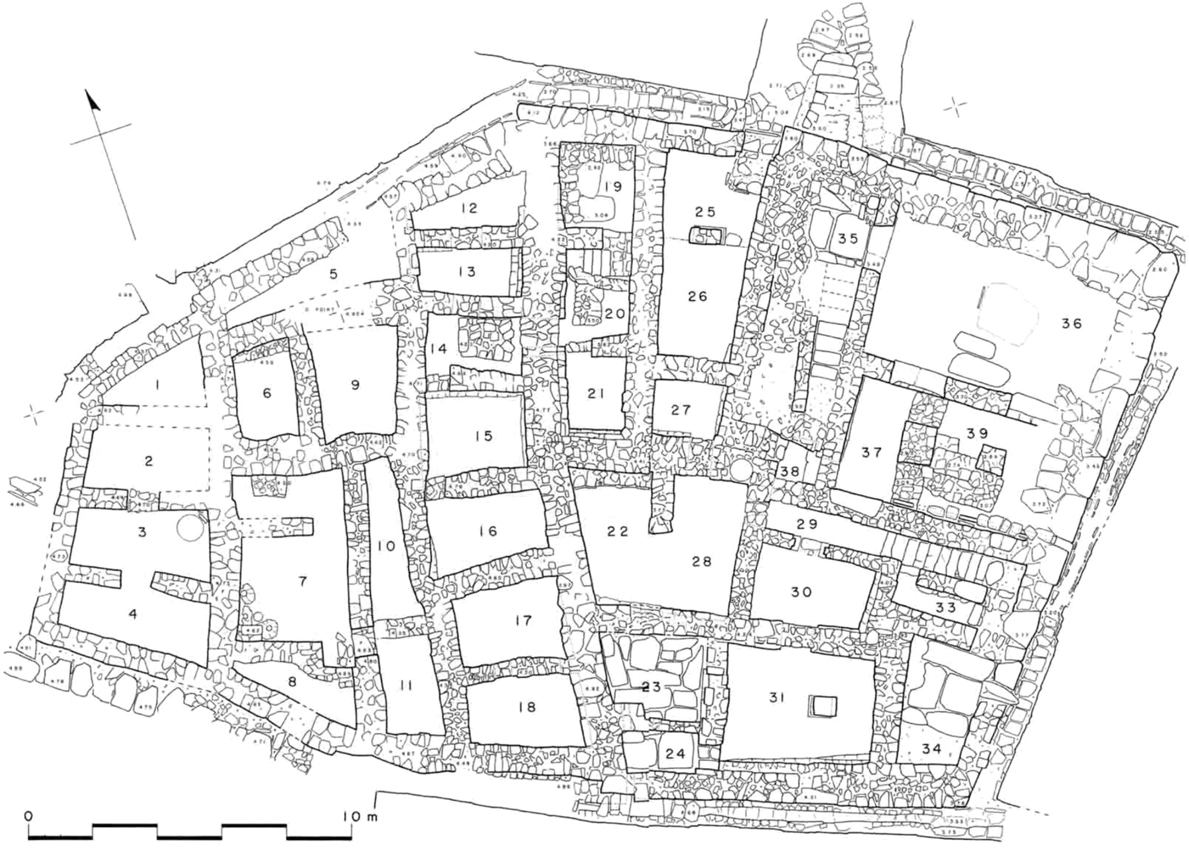

Fig. 14.3. Plan of House A, after Cummer and Schofield 1984: pls 6–7 (drawn by W. W. Cummer after 1:50 field plans by L. E. Cotsen; courtesy of the University of Cincinnati).

approach to planning, with the block-like arrangement of rooms in the east differing markedly from the tendency toward linear arrangements evidenced both in the western rooms of the house and elsewhere in the settlement (Cummer and Schofield 1984: 30, 40–1; Gorogianni and Fitzsimons 2010; Letesson 2009: 300–2; Papagiannopoulou 1991: 242).

While neither the exact mechanisms by which such foreign elements came to be incorporated into this structure nor the precise identity of its builders or occupants is certain, House A is almost universally labelled as the residence of the settlement's ruling authority (Berg 2007; Cummer 1980: 5; Davis 1984: 164; Davis and Gorogianni 2008: 347; Morgan 1998: 201; Papagiannopoulou 1991: 242, 260, 261; Petruso 1992: 35; Schofield 1982a: 18, 21; 1982b: 10; 1998: 119). Caskey, for example, in the foreword to its final publication, described House A as 'the largest single building and presumably the most important in the economic life of the community…(and later)…the principal building of its time on the site'. Cummer and Schofield, who authored the final publication, referred to it as 'a royal residence (or at least the seat of the governing authority)' and a 'microcosm' of the Minoan palaces, while other terms such as 'administrative centre', 'mansion', and even 'palace' have also been applied to it. Such labels are strengthened by, if not predicated upon, the observation that the rest of the site was dominated by structures of purely local design and construction throughout the entire 'Minoanizing' era. As a result, most discussions of Minoanization at Ayia Irini seem to assume the existence of a single, elite faction resident in House A, be it local or Cretan in origin, that was the primary (or even sole) driving force behind the introduction and incorporation of Minoan cultural elements into the settlement.

Such a top-down perspective, however, not only takes for granted the existence of a strict hierarchical system of government (Gorogianni and Fitzsimons 2016) but also runs the risk of overemphasizing the role played by the residents of House A in the socio-political landscape of the settlement, and relegating to the position of passive, almost involuntary, observers the other inhabitants of the site. Indeed, current discussions of Minoanization challenge more and more this traditional position and employ instead a distinctly bottom-up approach that explores the active, rather than passive, nature of the role played by settlements and their constituent inhabitants in the islands and on the Greek mainland in this process (e.g. Berg 2006: 139–40; 2007; Davis 1979, 1984; Dietz 1998; Davis and Gorogianni 2008; Graziadio 1998; Knappett and Nikolakopoulou 2008; Nikolakopoulou 2009; Schofield 1982a; Whitelaw 2005). This approach, which emphasizes the deliberate and conscious nature of individual and group participation in the socio-political and economic developments of the late Middle and early Late Bronze Age, has succeeded in demonstrating that the precise composition of the Minoan cultural package adopted by native communities and the manner in which it was integrated into the local symbolic vocabulary differed significantly in both quantitative and qualitative terms, not only between, but also within, those settlements operating within these regional exchange networks.

It is against such an intellectual background that this chapter presents some of the preliminary results of the Ayia Irini Northern Sector Archaeological Project (AINSAP) on the suite of rooms known as the North-east Bastion, the architectural, material, and iconographic evidence from which has led to its tentative identification as a Minoan-style banquet hall. This chapter will argue further that the existence of a second, distinct establishment of Minoan character located some distance from House A not only strengthens the position of Ayia Irini as one of the primary conduits for the reception and transmission of Minoan and Minoanizing cultural traits throughout the Aegean, but also provides further indication that the adoption, adaptation, and integration of such traits served as an important mechanism for the negotiation of status between members of individual communities. And, finally, we will conclude by offering a few observations that might, on the one hand, serve to illustrate the rather distinctive nature of the processes involved in the transmission of architectural, as opposed to artefactual, traits, and on the other, stimulate interest in exploring in more detailed and systematic fashion the Minoanized (and non-Minoanized) architectural landscape of the larger Aegean world.

14.2. THE NORTH-EAST BASTION

The North-east Bastion (Fig. 14.4) was excavated over the course of seven seasons in the 1960s, but—despite the richness of its contents and its physical prominence in the architectural landscape of the settlement—it has received little attention in the scholarly literature (Caskey 1964: 322; 1971: 374–5, 390; Gorogianni and Fitzsimons 2016: 144–9, 151). In his 1971 preliminary report, for example, Caskey (1971: 376) remarked upon its intimate connection with the fortification wall and suggested that the rooms on its upper storey housed members of the site's military personnel, though he provided no justification for or further elaboration on his suggestion. More recently, Lyvia Morgan (1990: 253; 1998; forthcoming) has emphasized the elaborate nature of its fresco decoration, the scale of its construction, and its dominating position overlooking the eastern approaches to the settlement, and has suggested that the rooms on its upper storey housed elite feasting activities associated with public festivals held in the open space east of the settlement (see also Marinatos and Morgan 2005: 120; Morgan forthcoming). By and large, however, aside from these brief mentions, and the preliminary publication of the fresco fragments by Katherine Abramovitz in 1980, the North-east Bastion has

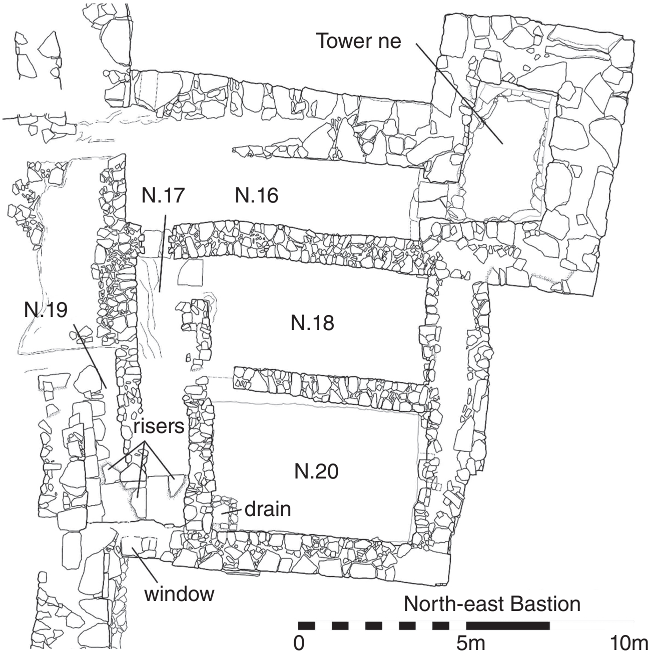

Fig. 14.4. Plan of the North-east Bastion (drawn by W. W. Cummer and inked by R. D. Fitzsimons; courtesy of the University of Cincinnati).

not figured into many discussions on Minoanization (see also Marinatos and Morgan 2005: 120–2).

One of the primary reasons for its omission from scholarly discourse is likely the spectacular nature of the discoveries from other areas of the settlement, notably the rich and well-preserved remains from House A and the striking collection of female figures from the so-called Temple (Caskey 1986). Compounding this situation is the fact that the entire northern extent of the settlement suffered severe damage on several occasions after its abandonment at the end of Period VIIa (LM IB),[5] thus hindering study of its remains. As early as the fourth or fifth century CE, for example, a significant portion of the fortification wall was dismantled and its stones melted down for the production of lime, as is indicated by the presence of a Late Roman kiln north of the North-east Bastion (Caskey 1971: 374). More recently, the construction of a roadway in the 1920s or 1930s across the northern reaches of the site obliterated almost all traces of ancient occupation in the area, resulting in the removal, in some areas, of up to 2 metres of fill (Davis 1986: 9, 12; Caskey 1964: 322; 1971: 372, 373). Further difficulties arose, moreover, once excavations commenced. The walls to the south of the road cutting, for instance, which in some cases were preserved to well over 2.5 metres in height, had been so damaged by the earthquake that struck the site in the LM IB period that they had to be partially dismantled to allow excavations to proceed (Figs 14.5 and 14.6). And, as work progressed, the high level of the water table meant that only two rooms and parts of two others could be excavated down to floor level (Caskey 1971: 374). Despite these difficulties, however, both the overall form and function of the North-east Bastion, at least of its ground floor, seem relatively well established.

The northern, eastern, and southern sides of the complex were established by the expansion of the fortification system early in Period VI (LM IA), part of the massive rebuilding programme that was undertaken at the end of Period V (MM IIIA) (Caskey 1972: 386–91; 1979; 1981: 323); its current western limit is defined by the course of the original line of the Period V fortification wall (Davis 1986: 8–15), although it is possible that the complex once extended further west into the area destroyed by the old road cutting. A wide corridor, N.16, running along the northern side of the building opened at its eastern end on to a small, rectangular chamber, Tower ne. A series of small chases set into the walls of this chamber at roughly the same level as the threshold likely served to support a wooden floor, beneath which was set a small crawlspace used for storage, an arrangement that has also been proposed for Tower e (Davis 1986: 13–14) and some of the rooms in House A (Cummer and Schofield 1984: 33). Another doorway at the western end of N.16 opened on to a second corridor running to the south, into whose eastern wall were cut two further doorways. The northern

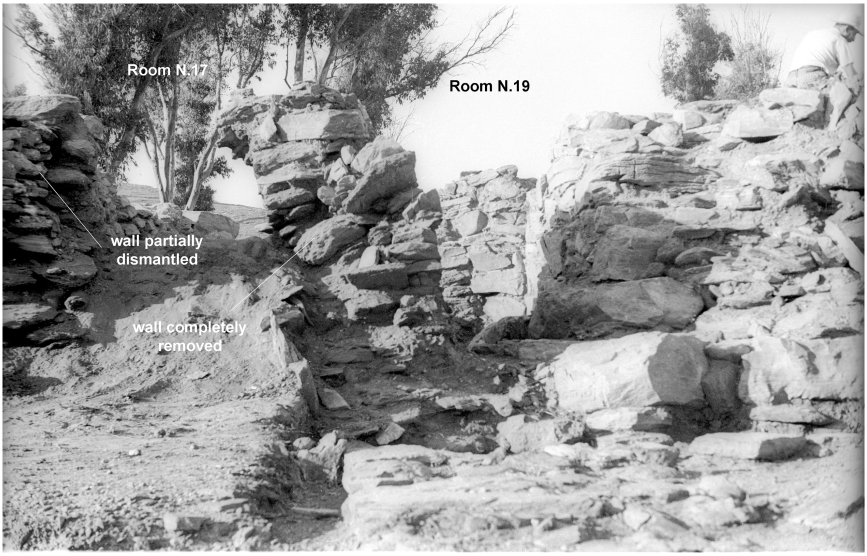

Fig. 14.5. Rooms N.17 and N.19 from the north, showing the state of the walls upon excavation in 1966 (photograph courtesy of the University of Cincinnati (KA-125–00A)).

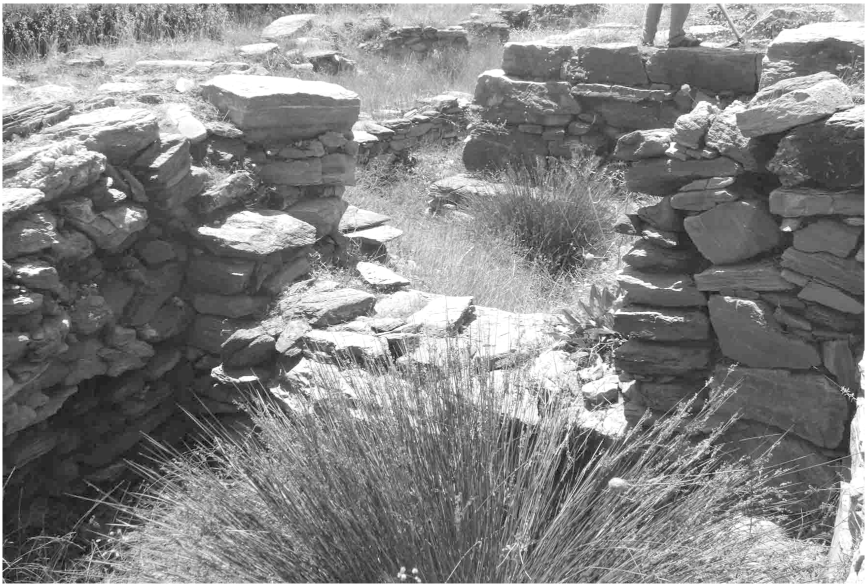

Fig. 14.6. Rooms N.17 and N.19 from the north, showing the current state of the walls (photograph by R. D. Fitzsimons).

door, whose threshold was brought to light roughly 20 cm below the water table, opened on to a large, rectangular chamber, N.18, into whose floor were sunk eleven pithoi, suggesting that this room functioned as the primary storage facility for the North-east Bastion. The southern door, which does not appear to have been cleared during excavation and which does not always appear on the published plans, opened on to a second, somewhat larger, rectangular chamber, into whose south-west corner was constructed a vertical drain that served to evacuate liquids from the upper storey to the exterior area to the south (Caskey 1971: 376, 390). Excavation in N.20 was halted before ground level was reached, but given the presence of the storage room to the north and the likely existence of a banquet hall on the upper storey, to be posited shortly, it seems probable that this room housed the main kitchen of the establishment, an assertion also supported by the pottery in the room.[6] The southern end of the north–south corridor appears to have been occupied by a well-built switchback staircase that served to provide communication between the upper and lower levels of the North-east Bastion (Fig. 14.7). One short flight of schist risers rose about 1 m to a paved landing, from which a second flight of risers, in N.19, ascended to the upper storey. A wide opening in the wall south of the landing is usually described as the main entrance to the building from the south (Caskey 1971: 376; Morgan 1998: 201), but the supposed threshold of this door rests roughly 80 cm above the landing, rendering such an identification impossible. Instead, it seems more likely that this opening housed the wooden frame and sill

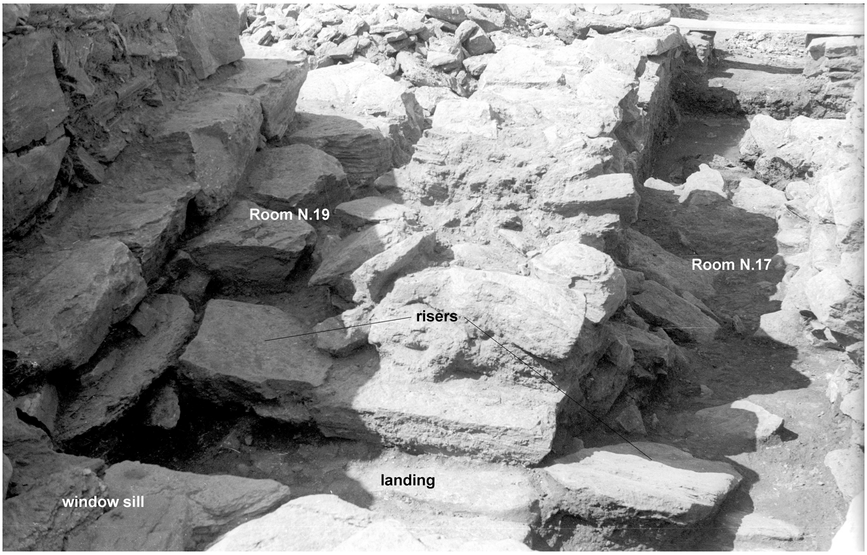

Fig. 14.7. Rooms N.17 and N.19 from the south, showing the remains of the switchback staircase and window sill (photograph courtesy of the University of Cincinnati (KA-142–17A)).

for a large window, rough cuttings for which are still discernable in the stones along its west side.[7]

The precise arrangement of the rooms in the upper storey cannot be ascertained with absolute certainty, but there are some indications that it mirrored the plan of the basement level.[8] A vertical seam in the western end of the north wall of Room N.20 may be the remnants of the east jamb of a doorway, while a flattish stone with a worn upper surface set immediately to its west could have served as its threshold (Fig. 14.8). It seems probable, therefore, that the space above Rooms N.18 and N.20 was occupied by two communicating rooms, a suggestion made also by Morgan on the basis of her identification of two distinct types of floor plaster fallen into the basement (Morgan 1998: 202; forthcoming). A series of vertical chases set into the eastern and southern walls of Room N.20 likely served to support the wooden substructure of the upper floor (Caskey 1971: 376), the level of which accords well with the proposed threshold and the top of the drain in the south-west corner of the room, while a large number of schist slabs fallen into the basement appear to be the remnants of stone paving.[9] The most spectacular aspect of the upper storey, however, is perhaps the rich decoration with which its walls were adorned (Abramovitz 1980; Morgan 1990, 1998, forthcoming): a number of panels bearing images of late summer plants, including blackberry bushes and myrtle, decorated the walls of the northern room, while a series of

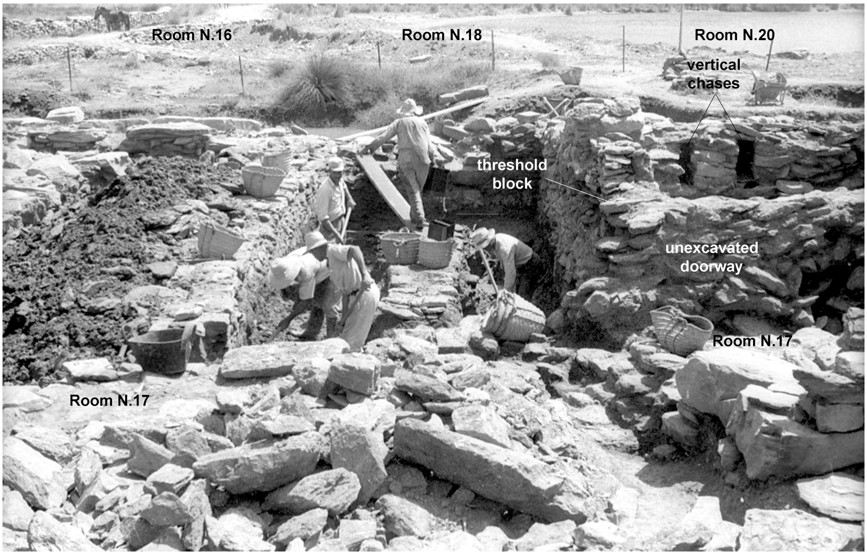

Fig. 14.8. Rooms N.18 and N.19 from the west, showing possible features associated with upper storey (photograph courtesy of the University of Cincinnati (KA-142–22)).

miniature frescoes depicting many men (some in procession, some cooking at a cauldron, some hunting a deer with dogs), a few women (including one running and one standing at a window), horses (and some chariots), and a number of ships against a backdrop formed by architectural facades, and a landscape featuring a river, rocky terrain, and vegetation (thistle and marshy plants) adorned the walls of the southern room. Though there is no direct evidence for such a construction, Morgan's suggestion that the eastern and southern walls of the upper storey were provided with multiple pier-and-window partitions is attractive,[10] since not only would such an arrangement provide the room with abundant light and air, it would also afford its occupants a spectacular view of any public gatherings that took place to the east and south.[11]

14.3. A MINOAN BANQUET HALL AT AYIA IRINI

Few of the elements evident in the design and construction of the North-east Bastion find parallel elsewhere at Ayia Irini, most notably the use of switchback staircases, the incorporation of multiple, long corridors, and the large size of the two eastern rooms and their strict rectilinear design. Switchback staircases do appear in House A, where there are two examples (Cummer and Schofield 1984: 6, 17, 36), and probably in the central section of Area N (Gorogianni, Cutler, and Fitzsimons 2015), while the eastern quadrant of

House A and two complexes of axially arranged rooms built against the fortification wall in Areas G (Caskey 1964: 377; 1971: 383) and L (Caskey 1964: 322–3; 1971: 383) do appear somewhat rectilinear in character. For the most part, however, the overall design of the North-east Bastion contrasts quite strongly with the rest of the settlement, where the dominant feature is the linear arrangement of small, rectangular or trapezoidal rooms connected by doorways aligned down their centre or along their side. Preliminary analysis suggests that such room strings stand as the hallmark of the local building tradition at Ayia Irini (Whitelaw 2005: 56; Gorogianni and Fitzsimons 2016: 148),[12] where they occur in a variety of settings: sometimes as independent buildings, as is the case of House F and several smaller structures in Areas W and L (Schofield 2011: 3–28);[13] sometimes along the interior face of the fortification wall, as in the examples cited above in Areas G and L, as well as in Area N; and sometimes as subunits of larger complexes, as in the western basements of House A. It seems likely, therefore, that those responsible for the construction of the North-east Bastion drew their inspiration from sources that lay beyond the traditional building practices of the island itself.

In fact, the best parallels for the formal and functional arrangement of space here would appear to be found in the Neopalatial palaces of Crete, in those suites of rooms bordering the central courts which Graham (1961) labelled 'Banquet Halls'. At Malia, for instance, above Rooms IX1 and IX2, Graham (1961: 168–9) reconstructed a columned hall provided with wide windows on the southern wall and accessed via the switchback staircase in IXa–b, while to the north, a second stairwell communicated with the storage facilities in blocks IX, XXI, and XXII and the food preparation areas in blocks XXIV and XXV (Fig. 14.9). Graham proposed that similar arrangements existed in the north wings of the palaces at Phaistos and Kato Zakros, as well perhaps in and above the North Pillar Hall at Knossos (Graham 1961, 1975), while Soles (1991: 64–5) argued for the existence of yet another banquet hall complex on the north side of the central court at Gournia. It is true that the North-east Bastion does not copy in wholesale or mechanical fashion the formal and functional arrangement of space in these Cretan complexes, but neither is it true that any of them are slavish imitations of one another. Instead, as was the case with the spread of palatial architectural elements across Crete and the Aegean in general, it is rather the conception of how the space was to be organized and the social and ritual activities which it was intended to house that were of primary importance. In effect, then, those who commissioned and those who constructed the North-east Bastion, and indeed, the east wing of House A, made a deliberate and conscious decision not to mimic, but to adopt, adapt, and integrate those specific design features that best suited their purposes (Shaw 1978; Schofield 1982a: 11), an observation that has also been made by Abramovitz (1980: 69–71) and Morgan (1990; 1998: 204–5; forthcoming) with regard to the wall paintings recovered from across the settlement (see also Coleman 1973: 285, 293).

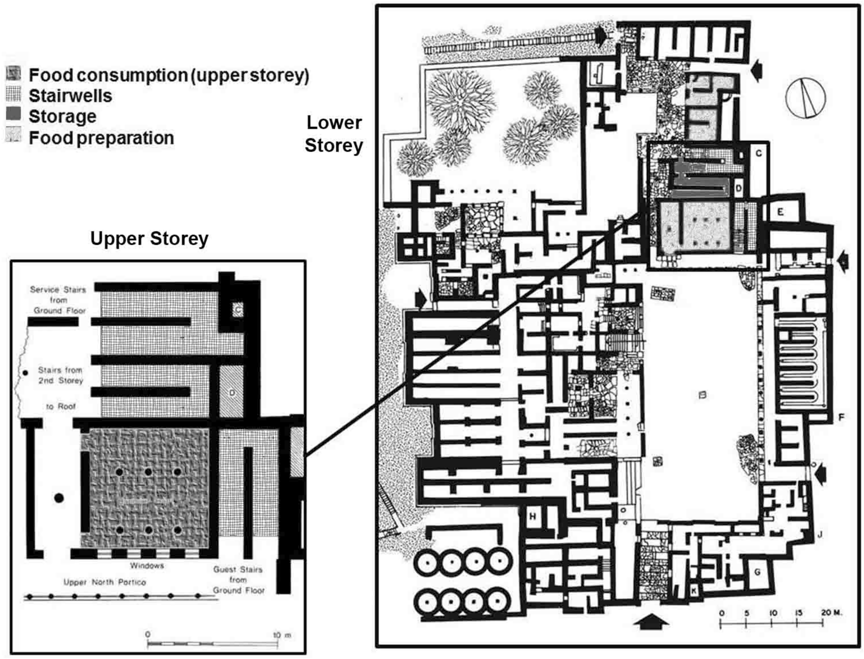
▨ Food consumption (upper storey)
▦ Stairwells
■ Storage
▒ Food preparation
Lower Storey
Upper Storey
Service Stairs from Ground Floor
C
Stairs from 2nd Storey to Roof
D
Windows
Upper North Portico
Guest Stairs from Ground Floor
0
10 m
C
D
E
B
F
J
G
K
H
0 5 10 15 20 M.

Fig. 14.9. Plan of the palace and possible banquet hall at Malia (adapted by R. D. Fitzsimons from Graham 1987: fig. 6).

More important, perhaps, than merely identifying the presence of a second complex at Ayia Irini that incorporates Cretan architectural features, or indeed, of enumerating them in list-like fashion, is assessing the significance of such a structure in the socio-political landscape of the settlement. The scale of its design and the elaboration of its decoration leave no doubt that its construction required the expenditure of a significant amount of human and capital resources, and it is tempting, therefore, to associate the North-east Bastion with the occupants of House A, for whom it would have served as an additional manifestation of high status and the control, economic or otherwise, that they exercised over the other inhabitants of the site. The intimate nature of its position within the expanded fortification system, moreover, itself a monumental expression of wealth and power, might then be viewed as further symbol of the prominent position held by this central authority.

Such an argument, however, rests upon the assumption that there was but a single faction within the community that possessed the desire and ability to access and incorporate architectural features derived from Minoan or other Aegean building traditions and mobilize sufficient resources to organize and implement the construction, or rather reconstruction, of the fortification system (Gorogianni and Fitzsimons 2016).[14] Given the fact that we lack direct evidence for the nature of social and political organization not only on Kea but throughout the Aegean islands and even to a large extent on Crete itself (e.g. Hamilakis 2002), it is entirely possible that the socio-political landscape of Ayia Irini was less hierarchical than currently envisioned and rather more corporate in nature, a landscape populated by a variety of competing and cooperative factions possessed of different levels of desire and ability to participate in this game of Minoanization.[15] According to this approach, some residents of the settlement, such as those responsible for the construction of House A and the North-east Bastion, chose to refashion their physical environment by emulating the latest architectural, iconographic, administrative, and social fashions current amongst their peers on Minoan Crete. Others, such as the occupants of House C (Fig. 14.1) (Schofield 2011: 135–57), restricted either by desire or necessity, incorporated one or two non-local elements into the design of their domicile, or, as was the case with the occupants of House J (Fig. 14.1) (Caskey 1964: 323; Coleman 1973: 293–6; Schofield 2011: 79, 91),[16] adhered entirely to local building techniques, but nevertheless opted to decorate their traditional abodes in Minoan fashion. And still others, a significant portion of the local populace if the quantity of relevant finds is any indication, limited their involvement to the manufacture and trade of products in the new global exchange networks that were rapidly expanding across the region.[17] Such a scenario is not without parallel in the Aegean: indeed, a similarly varied architectural landscape, albeit one characterized by a more intense incorporation of non-local features and a much greater level of general wealth, is also evident at Akrotiri, where the same sort of heterarchical system can easily be envisioned as operating.

More problematic for such a scenario at Ayia Irini, perhaps, is the fortification system, the very presence of which would seem, on the surface at least, to support the notion of a single, central authority governing the settlement. It should be noted, however, that the original circuit wall was laid not in Period VI or VII, when House A was supposedly the dominant structure on the site, but rather in Period V, when there was no such singular edifice (Fig. 14.10). Moreover, close examination of the construction of the fortification wall reveals that it was not erected as a single unit, but rather was composed of discrete sections built in piecemeal fashion (Caskey 1971: 389). One explanation for such a phenomenon is that the labour force was composed of various gangs of workmen drawn from throughout the community, each of which was free to follow its own particular method of construction. And, while it is true that such a division of labour is not incompatible with the existence of a single, driving force behind this building programme, neither is it incompatible with a system in which different factions within the community combined their efforts in cooperative fashion to achieve the same end. In this light, it is interesting to note that the repairs and in particular, the expansion, undertaken to the fortification system in Period VI give the impression less of a

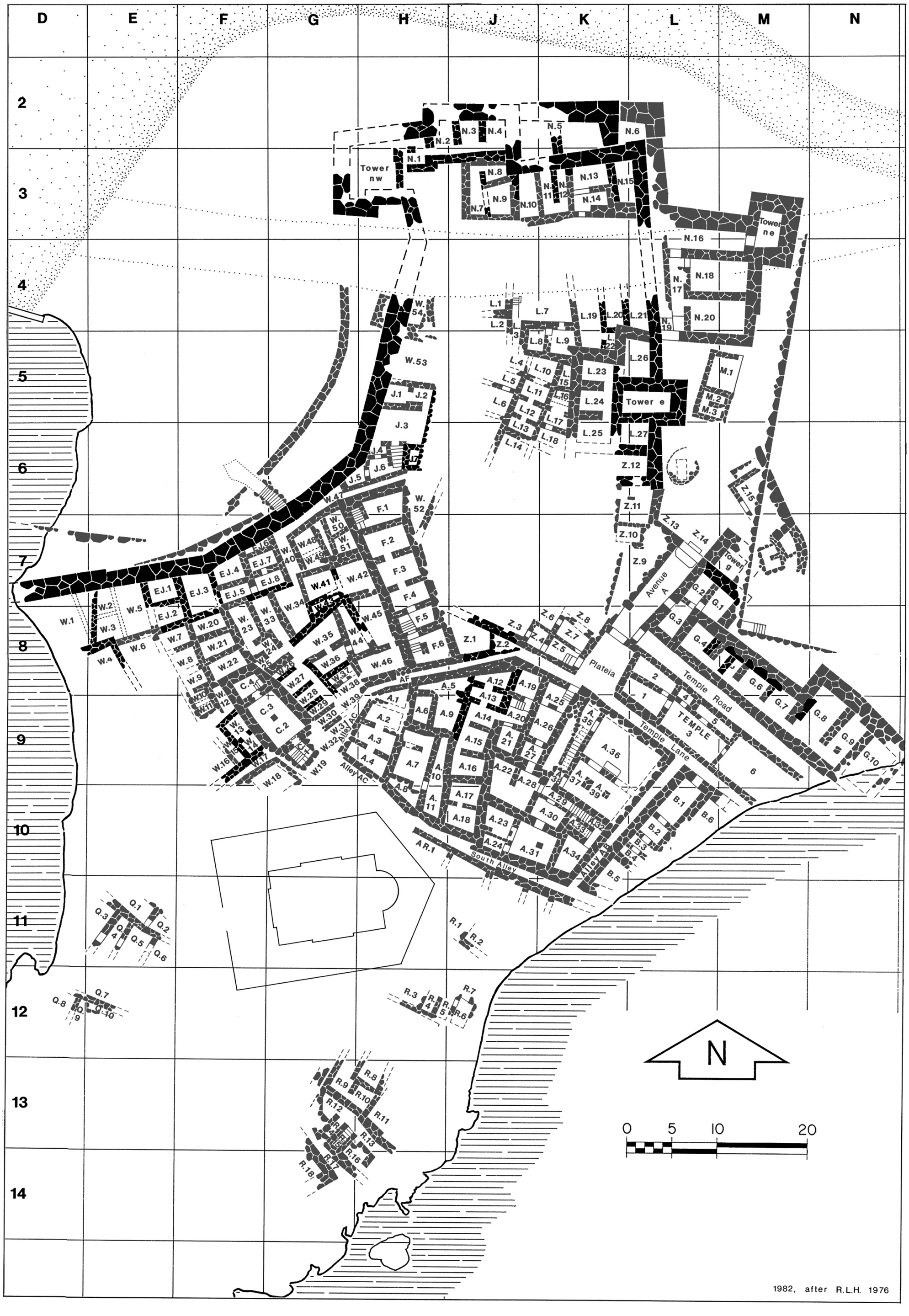

Fig. 14.10. Plan of Ayia Irini, showing Period V remains (modified by R. F. Fitzsimons following Davis 1986).

wholesale, site-wide renovation project conducted under the auspices of a central governing power, and more of a series of smaller, independent enhancements implemented by and for, at least directly, more discrete sections of the community.

14.4. MINOANIZING ARCHITECTURE IN THE AEGEAN ISLANDS

The identification of a Minoan-style banquet hall in the North-east Bastion at Ayia Irini adds to the corpus of Cretan-influenced structures discovered across the Aegean (Fig. 14.2), but with the exception of Akrotiri (Palyvou 1986, 1990, 1999a, 1999b; Shaw 1978), and to some extent Phylakopi (Atkinson 1904; Brodie 2009; Mackenzie 1904; Renfrew et al. 2007a; Whitelaw 2005), none of the relevant sites has been published in a full and complete manner.[18] As a result, with an absence of appropriate architectural plans, a paucity of helpful photographs, and a shortage of discussions of the materials associated with these structures, it is difficult, if not impossible, to assess with any degree of detail or certainty the nature and significance of these structures. On the other hand, the available evidence is too tantalizing to ignore, and it is perhaps worthwhile to conclude this paper by noting the following three observations that may serve to provide a productive framework for future research on this topic.

The first observation is that the mere presence of Minoan architectural features in a structure cannot be taken as an indication that it housed the central authority of a settlement. While it is true that Iasos (Momigliano 2005, 2007, 2009), Phylakopi (Atkinson 1904: 40–1; Mackenzie 1904: 260–2, 269; Renfrew et al. 2007b: 50–3; Whitelaw 2005: 51–61), and the Seraglio on Kos (Marketou 1998: 63; Shaw 2009: 171; Vitale and Hancock 2010: 68; 2013: 50), have so far produced only single examples, it is important to note that limited sections of the relevant levels of these sites have yet been exposed. It is entirely possible, therefore, that additional such structures remain to be discovered, and that each site in fact housed multiple Minoanized buildings, as is the case at Akrotiri (e.g. Hood 1990; Palyvou 1986, 1990, 1999a, 1999b; Shaw 1978, 2009: 170–1), Trianda (Marketou 1988: 28–30; 1998: 45–9; 2009, 2010: 763–4; 2014; Shaw 2009: 171), and, as has been argued here, Ayia Irini (see also Shaw 2009: 171). But even if such turns out not to be the case, as has been demonstrated for a wealth of other features of the Minoan cultural package (e.g. Broodbank 2004; Davis 1984; Whitelaw 2005: 59–60), there is no reason to believe that the adoption and adaptation of Minoanized architectural elements was restricted to a single faction at any settlement in the region; indeed, palatial architectural features appear to have been employed in exactly the same fashion on Crete as well (Driessen 1982, 1989–90; McEnroe 1982).

The second observation is that, while some of these structures were provided with elaborate exterior facades, notably the Xeste buildings at Akrotiri and perhaps Building F at Iasos (Momigliano 2005: 218; 2009: 126–7), the focus of much of the Minoanizing architectural activity was more often the interior of the building. Moreover, while the specific combination of the imported design elements varied from structure to structure, the overall result of their juxtaposition appears often to have been the creation of formal spaces that mimicked the spatial configuration found in the banquet halls and Minoan hall systems of Neopalatial Crete (Driessen 1982; Hitchcock 1994; Letesson 2013; Marinatos and Hägg 1986; Shaw 2011). Two such examples have already been cited at Ayia Irini, in House A and the North-east Bastion. At Akrotiri, similar combinations of large, fresco-adorned rooms, pier-and-door partitions, and switchback staircases can be found, for instance, in the West House, Building Delta, and Xeste 3 and 4. An analogous combination of Minoanizing elements is also found at Phylakopi, where Atkinson's excavations in the early years of the last century brought to light a suite of basement rooms that included two storerooms in the form of pillar crypts flanking a possible switchback staircase (Atkinson 1904: 40–1; Mackenzie 1904: 260–2, 269; Morgan and Cameron 2007; Renfrew et al. 2007b: 50–3; Whitelaw 2005: 51–61). The presence of a few gamma-shaped pier bases and numerous fragments of painted plaster amongst the debris fallen into and around these rooms suggests the existence of a frescoed parlour provided with pier-and-door partitions on the upper storey, similar to those at Akrotiri and Ayia Irini. And though the larger architectural context into which they were set is missing in most cases, at least four additional pier-and-door partitions have been identified in Kos (Marketou 1998: 63; Shaw 2009: 171; Vitale and Hancock 2010: 68; 2013: 50) and Rhodes (Marketou 1988: 28–30; 1998: 45–9; 2009; 2010: 763–4; 2014; Shaw 2009: 171).

The third observation is that, unlike the Minoanization of local pottery traditions, which appears to have been a rather lengthy process that underwent intensification, expansion, and elaboration over the course of several centuries (Broodbank 2004; Berg 2007: 168; Davis and Gorogianni 2008; Knappett and Nikolakopoulou 2008: 37; Papagiannopoulou 1991: 261–73; Whitelaw 2005), the era of the Minoanized architectural landscape in the Aegean seems to have been of a much more limited duration. In fact, each of the Minoanized buildings mentioned here was constructed either in the Middle Minoan III or early LM IA period,[19] precisely when the exchange networks criss-crossing the Aegean reached their highest intensity (e.g. Davis and Gorogianni 2008: 346–7; Knappett and Nikolakopoulou 2008: 37). Moreover, only two examples, House A and the North-east Bastion at Ayia Irini, continued in use past the Theran eruption into the LM IB period, by which time the phenomenon of Minoanization had begun to wane (e.g. Berg 2007: 163–4; Davis and Gorogianni 2008: 343–5).

A complete discussion of this topic is, unfortunately, beyond the scope of the present chapter, and one that needs to draw upon not just the architectural remains but also the iconographic and artefactual evidence associated with them. But, given the three observations listed above, it is nevertheless tempting to see in these Minoanized complexes a physical manifestation of the so-called 'New Environment' proposed by Davis and Gorogianni (2008), a formalized architectural setting in which select participants engaged in a series of social and political rituals associated, at least in part, with the process of acquiring and maintaining a Minoan or Minoanizing identity.[20]

14.5. CONCLUSIONS

Recent discussions of the phenomenon of acculturation that spread across the Aegean at the transition from the Middle to Late Bronze Age have begun moving in new and exciting directions, away from approaches that treat the concept of 'Minoanization' as a monolithic process and more towards perspectives that recognize and consider the more nuanced complexities and subtleties that it entailed (Berg 2007; Papagiannopoulou 1991; Whitelaw 2005). The application of new theoretical approaches, most notably perhaps network and agency theory, together with advances in scientific methodology—in particular macroscopic and microscopic ceramic fabric analysis—have led to the realization that the suite of so-called 'Minoan' cultural traits that characterized this period was much more varied and hybrid in character than previously considered (Broodbank 2004: 51–2; Davis and Gorogianni 2008; Momigliano 2005: 222–3; 2007: 259; 2009: 121–3, 136–7; Nikolakopoulou 2009: 31–2; Raymond 2007). While Crete may have been the ultimate source and prime inspiration for many (if not most) of the Minoanizing features in this cultural package, it now seems certain that its contents drew as well from other sources throughout the region and incorporated elements that themselves were hybrid in nature. Moreover, it is now recognized that the cultural landscape of Crete itself was no more uniform in character than the suite of Minoanizing traits it inspired. Indeed, recent scholarship increasingly acknowledges the fact that, whatever their precise configuration, Crete was populated by a variety of polities whose inhabitants participated to varying degrees and in varying fashions in the dissemination and integration of non-local features, both throughout the wider Aegean world and within the island itself (Berg 2007: 69–70; Broodbank 2004; Hamilakis 2002; Nikolakopoulou 2007: 32).

The work conducted by the members of AINSAP at Ayia Irini over the past few years represents a continuation and expansion of such scholarship, and demonstrates that the gradual and partial incorporation of non-local elements into the local cultural vocabulary was the product of a highly selective and deliberate process undertaken, at least in part, by local communities throughout the Aegean to suit their specific and individual social, economic, and political needs. Moreover, the identification of a second, independent establishment of Minoan character, the North-east Bastion, located some distance from House A not only strengthens the position of Ayia Irini as one of the primary conduits for the reception and transmission of Minoan and Minoanizing cultural traits throughout the region but also illustrates the complex and important role such processes played at multiple socio-political levels, most notably amongst the members of a single community. In essence, it is perhaps time to insert a new leaf into the figurative Minoanizing banqueting table and allow a more varied and representative range of guests to take their place at this cultural and intellectual feast.

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NOTES

1. Preliminary reports on the excavations at Ayia Irini appear in Caskey 1962, 1964, 1966, 1971, while chronological summaries can be found in Caskey 1969, 1979, 1981. The ongoing series of final publications includes studies of specific chronological phases (Davis 1986; Overbeck 1989; Wilson 1999), larger sectors (Schofield 2011), individual buildings (Cummer and Schofield 1984; Caskey 1986), and specialized materials (Bikaki 1984; Georgiou 1986; Petruso 1992; Morgan forthcoming).
2. Note that Branigan (1981: 29–30; 1984: 51) did not acknowledge the Minoanizing elements in House A in his discussions on colonialism, while Schofield (1984: 47),

though admitting the likely presence of Minoan settlers, stated that at Ayia Irini 'it has not yet proved possible to identify a single Minoan household'. Hood (1990: 120) and Dietz (1998: 29), too, downplayed the Minoan elements in House A.

3. Hitchcock's list (1998: 172) of nineteen Minoan and Minoanizing architectural elements, for example, includes some features that are by no means unique to Crete (e.g. courts, terracing), some that likely arose because of local peculiarities (e.g. the heavy use of limestone, which is available from an easily accessible quarry immediately north of the site), some whose resemblance just as easily derives from functional similarities (e.g. the irregular, 'labyrinthine' ground plan; the U-shaped drain; slots for wooden door frames), and at least one (cut stone masonry) that is not, in fact, evident.
4. Cummer (1980: 6) and Schofield (1983: 297) denied the existence of a pier-and-door partition in House A, though it is easy to envision one occupying the wall that separates Room 36 from Rooms 37/39 (Fig. 14.3).
5. Caskey (1972: 393–7; 1979; 1981: 323) originally dated the 'Great Destruction' to the end of Period VII (LM IB/LH II), though more recent study of the ceramics has led to the subdivision of Period VII into three periods, with the 'Great Destruction' occurring at the end of Period VIIB, or LM IB/LH IIA (Hershenson 1998).
6. Morgan (1998: 202) also suggested that Room N.20 was a kitchen, an identification based largely on the presence of the drain.
7. Similar combinations of switchback staircases and windows have been noted on Crete, as for example in the Royal Villa (Evans 1928: 396–413) and South House (Evans 1928: 373–90) at Knossos, and at Akrotiri, as for example in the West House (Palyvou 1990: 46, 50–1; Hitchcock 1998: 171).
8. Caskey (1971: 376) originally assigned the upper portions of these walls to a rebuilding of the North-east Bastion, but reanalysis of the extant remains carried out in 2009 and 2010 suggests that they instead belong to a second storey.
9. Flat, schist slabs, sometimes lined with red plaster, were also used in the construction of upper storey floors in several rooms in House A, e.g. A.19, A.27, A.35 (Cummer and Schofield 1984: 6, 12, 19). Caskey (1971: 376) attributed the slabs from the North-east Bastion to an upper storey bathroom, perhaps on analogy with the toilet he identified in Room A.24 of House A (Cummer and Schofield 1984: 18).
10. Morgan, personal communication 2010.
11. A parallel arrangement can be found in the West House at Akrotiri, where the north-west corner of Room 5 is provided with pier-and-window partitions flanked by frescoed panels and surmounted by a miniature frieze (Marinatos 1984: 43–51), while a similar arrangement also appears in the Queen's Megaron at Knossos (Evans 1930: 354–69; Hitchcock 1994).
12. For a brief discussion of local architectural features at Ayia Irini, see Cummer 1980.
13. Brief mention of House F also appears in Caskey 1966: 373–4; 1971: 386–7. Only small, exploratory trenches were opened in Areas Q and R, but here, too, the remains seem to follow the same pattern (Caskey 1971: 388).
14. Brief reference to the fortification system can be found in Caskey 1962: 277–8; 1964: 320–2; 1966: 364–5; 1971: 363–5, 373–4, 376–7; see also Overbeck 2007: 341.

No thorough study of the phasing of the fortification wall after Period V has been published, but Caskey (1971: 363) and Schofield (1998: 120; 2012: 1, 53, 55) did make note of some areas that had been rebuilt in the Western Sector.

15. For heterarchy, see Crumley 1995. For a similar discussion of the political organization of Protopalatial Crete, see Schoep 2010.
16. Additional wall painting fragments, including some with figural decoration, were recovered from House B (Caskey 1966: 374; Abramovitz 1980: 62, 67, 76–7, 78; Morgan 1990: 252) and the Temple (Abramovitz 1980: 77, 81).
17. Although a complete and thorough analysis must await the full publication of the entire settlement, it is perhaps noteworthy that the distribution of several important artefactual types, notably lead weights (Gale 1998: 739, 752) and crucibles, slag, and litharge (Gale 1998: 740, 752), seems to suggest the (economic, if not political) independence of most households within the economic landscape at Ayia Irini.
18. For a summary of Minoan architectural elements abroad, see Shaw 2009: 169–78.
19. Dietz 1998: 28–9; Whitelaw 2004: 157; Renfrew et al. 2007b: 52–3; Brodie 2009: 51, 59–64; see Whitelaw 2005: 46 for a different date (Phylakopi); Marketou 1998: 45–60; 2010: 763–4; 2014: 182–9 (Trianda); Momigliano 2007: 268; 2009 (Iasos); Vitale and Hancock 2010: 65–74; 2013 (Seraglion on Kos).
20. For similar comments on Minoanizing pottery in the Aegean, see, for example, Berg 2004: 80; 2007: 105–6; Knappett and Nikolakopoulou 2008: 39. See also Gorogianni and Fitzsimons forthcoming.

REFERENCES

Abell, N. 2014. ‘Migration, Mobility and Craftspeople in the Aegean Bronze Age: A Case Study from Ayia Irini on the Island of Kea’. *World Archaeology* 46.4: 551–68.

Abramovitz, K. 1980. ‘Frescoes from Ayia Irini, Keos. Parts II–IV’. *Hesperia* 49.1: 57–85.

Atkinson, T. D. 1904. ‘The Architecture’. In *Excavations at Phylakopi in Melos Conducted by the British School at Athens*, edited by T. D. Atkinson. London: Macmillan: 25–69.

Berg, I. 2004. ‘The Meanings of Standardization: Conical Cups in the Late Bronze Age Aegean’. *Antiquity* 78: 74–86.

Berg, I. 2006. ‘The “Western String”: A Reassessment’. In *Πεπραγμένα Θ’ Διεθνούς Κρητολογικού Συνεδρίου, Ελούντα, 1–6 Οκτωβρίου 2001. Α4: Προϊστορική περιόδος, Συμμεικτά*, edited by E. Tambaki and A. Kaloutsakis. Herakleion: *Εταιρία Κρητικών Ιστορικών Μελέτων*: 135–50.

Berg, I. 2007. *Negotiating Island Identities: The Active Use of Pottery in the Middle and Late Bronze Age Cyclades*. Piscataway, NJ: Gorgias Press.

Bikaki, A. H. 1984. *Keos IV. Ayia Irini: The Potters’ Marks*. Mainz-am-Rhein: Philipp von Zabern.

Branigan, K. 1981. ‘Minoan Colonialism’. *Annual of the British School at Athens* 76: 23–33.

Branigan, K. 1984. 'Minoan Community Colonies in the Aegean?'. In *The Minoan Thalassocracy: Myth and Reality. Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska institutet i Athen: 49–54.

Brodie, N. 2009. 'A Reassessment of Mackenzie's Second and Third Cities at Phylakopi'. *Annual of the British School at Athens* 104: 49–72.

Broodbank, C. 2004. 'Minoanisation'. *Proceedings of the Cambridge Philological Society* 50: 46–91.

Caskey, J. L. 1962. 'Excavations in Keos, 1960–1961'. *Hesperia* 31.3: 263–83.

Caskey, J. L. 1964. 'Excavations in Keos, 1963'. *Hesperia* 33.3: 314–35.

Caskey, J. L. 1966. 'Excavations in Keos, 1964–1965'. *Hesperia* 35.4: 363–76.

Caskey, J. L. 1969. 'Crises in the Minoan-Mycenaean World'. *Proceedings of the American Philosophical Society* 113.6: 433–49.

Caskey, J. L. 1971. 'Investigations in Keos. Part I: Excavations and Explorations, 1966–1970'. *Hesperia* 40.4: 359–96.

Caskey, J. L. 1972. 'Investigations in Keos. Part II: A Conspectus of the Pottery'. *Hesperia* 41.3: 357–401.

Caskey, J. L. 1979. 'Ayia Irini, Keos: The Successive Periods of Occupation'. *American Journal of Archaeology* 83.4: 412.

Caskey, J. L. 1981. 'Notes on Keos and Tzia'. *Hesperia* 50.4: 320–6.

Caskey, M. E. 1986. *Keos II. The Temple at Ayia Irini, Part I: The Statues*. Princeton, NJ: American School of Classical Studies at Athens.

Coleman, K. 1973. 'Frescoes from Ayia Irini, Keos. Part I'. *Hesperia* 42.3: 284–300.

Crumley, C. L. 1995. 'Heterarchy and the Analysis of Complex Societies'. In *Heterarchy and Social Formation*, edited by C. L. Crumley, J. Levy, and R. Erenreich. Washington, DC: American Anthropological Association: 1–5.

Cummer, W. W. 1980. 'Itinerant Aegean Builders'. *Temple University Aegean Symposium 5*: 3–14.

Cummer, W. W. and E. Schofield. 1984. *Keos III. Ayia Irini: House A*. Mainz-am-Rhein: Philipp von Zabern.

Davis, J. L. 1979. 'Minos and Dexithea: Crete and the Cyclades in the Later Bronze Age'. In *Papers in Cycladic Prehistory*, edited by J. L. Davis and J. F. Cherry. Los Angeles: Institute of Archaeology: 143–57.

Davis, J. L. 1984. 'Cultural Innovation and the Minoan Thalassocracy at Ayia Irini, Keos'. In *The Minoan Thalassocracy: Myth and Reality. Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska institutet i Athen: 159–66.

Davis, J. L. 1986. *Keos V. Ayia Irini: Period V*. Mainz-am-Rhein: Philipp von Zabern.

Davis, J. L. and E. Gorogianni. 2008. 'Potsherds from the Edge: The Construction of Identities and the Limits of Minoanized Areas of the Aegean'. In *Horizon: A Colloquium on the Prehistory of the Cyclades*, edited by N. Brodie, J. Doole, G. Gavalas, and C. Renfrew. Cambridge: McDonald Institute for Archaeological Research: 339–48.

Dickinson, O. T. P. K. 1994. *The Aegean Bronze Age*. Cambridge: Cambridge University Press.

Dietz, S. 1998. 'The Cyclades and the Mainland in the Shaft Grave Period—A Summary'. *Proceedings of the Danish Institute in Athens* 2: 9–36.

Driessen, J. 1982. 'The Minoan Hall in Domestic Architecture on Crete: To Be in Vogue in Late Minoan IA?'. *Acta Archaeologica Lovaniensia* 21: 27–92.

Driessen, J. 1989–90. 'The proliferation of Minoan Palatial Architectural Style (I) Crete'. *Acta Archaeologica Lovaniensia* 28–9: 3–23.

Evans, A. 1928. *The Palace of Minos at Knossos II*. London: Macmillan.

Evans, A. 1930. *The Palace of Minos at Knossos III*. London: Macmillan.

Gale, N. H. 1998. 'The Role of Kea in Metal Production and Trade in the Late Bronze Age'. In *Kea-Kythnos: History and Archaeology*, edited by L. G. Mendoni and A. Mazarakis-Ainian. Athens: Research Centre for Greek and Roman Antiquity, National Hellenic Research Foundation: 737–58.

Georgiou, H. S. 1986. *Keos VI. Ayia Irini: Specialized Domestic and Industrial Pottery*. Mainz-am-Rhein: Philpp von Zabern.

Gorogianni, E., J. Cutler, and R. D. Fitzsimons. 2015. 'Something Old, Something New: Non-Local Brides as Catalysts for Cultural Exchange at Ayia Irini, Kea?'. In *Nostoi: Indigenous Cultures, Migration and Integration in the Aegean Islands and Western Anatolia during the Late Bronze Age and Early Iron Age*, edited by N. Stampolidis, Ç. Maner, and K. Kopanias. Istanbul: Koç University Press: 853–86.

Gorogianni, E. and R. D. Fitzsimons. 2010. 'Ayia Irini and Minoanization: A Bottom-up Approach to a Pan-Aegean Phenomenon' (lecture, American Institute of Archaelogy 111th Annual Meeting, Anaheim, CA, 7 January 2010).

Gorogianni, E. and R. D. Fitzsimons. 2016. 'Social Complexity in MBA and LBA Cyclades: A View from Ayia Irini'. In *Explaining Change in Aegean Prehistory. Conference at the University of Groningen, Netherlands, 17–18 October 2013,* edited by C. Wiersma and S. Voutsaki. Oxford: Oxbow Books: 124–58.

Graham, J. W. 1961. 'The Minoan Banquet Hall: A Study of the Blocks North of the Central Court at Phaistos and Mallia'. *American Journal of Archaeology* 65.2: 165–72.

Graham, J. W. 1975. 'The Banquet Hall of the Little Palace'. *American Journal of Archaeology* 79.2: 141–4.

Graham, J. W. 1987. *The Palaces of Crete*. Princeton, NJ: Princeton University Press.

Graziadio, G. 1998. 'Trade Circuits and Trade-Routes in the Shaft Grave Period'. *Studi Micenei ed Egeo-Anatolici* 40: 29–76.

Hamilakis, Y. 2002. 'Too Many Chiefs? Factional Competition in Neopalatial Crete'. In *Monuments of Minos: Rethinking the Minoan Palaces* (Aegaeum 23), edited by J. Driessen, I. Schoep, and R. Laffineur. Liège: Université de Liège: 179–200.

Hershenson, C. 1998. 'Late Helladic IIB at Ayia Irini, Keos'. In *Kea-Kythnos: History and Archaeology*, edited by L. G. Mendoni and A. Mazarakis-Ainian. Athens: Research Centre for Greek and Roman Antiquity, National Hellenic Research Foundation: 161–8.

Hitchcock, L. 1994. 'The Minoan Hall System: Writing the Present out of the Past'. In *Meaningful Architecture: Social Interpretations of Buildings*, edited by M. Locock. Aldershot: Avebury: 14–43.

Hitchcock, L. 1998. 'Blending the Local with the Foreign: Minoan Features at Ayia Irini, House A'. In *Kea-Kythnos: History and Archaeology*, edited by L. G. Mendoni and A. Mazarakis-Ainian. Athens: Research Centre for Greek and Roman Antiquity, National Hellenic Research Foundation: 169–74.

Hood, S. 1990. 'The Cretan Element on Thera in Late Minoan IA'. In *Thera and the Aegean World III:1. Archaeology*, edited by D. A. Hardy. London: Thera Foundation: 118–23.

Knappett, C. 2011. *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*. Oxford: Oxford University Press.

Knappett, C., T. Evans, and R. Rivers. 2008. 'Modelling Maritime Interaction in the Aegean Bronze Age'. *Antiquity* 82.318: 1009–24.

Knappett, C. and I. Nikolakopoulou. 2005. 'Exchange and Affiliation Networks in the MBA Southern Aegean: Crete, Akrotiri and Miletus'. In *EMPORIA: Aegeans in the Central and Eastern Mediterranean* (Aegaeum 25), edited by R. Laffineur and E. Greco. Liège: Université de Liège: 175–84.

Knappett, C. and I. Nikolakopoulou. 2008. 'Colonialism without Colonies? A Bronze Age Case Study from Akrotiri, Thera'. *Hesperia* 77.1: 1–42.

Letesson, Q. 2009. *Du phénotype au génotype: analyse de la syntaxe spatiale en architecture minoenne (MM IIIB–MR IB)* (Aegis 2). Louvain-la-Neuve: Presses universitaires de Louvain.

Letesson, Q. 2013. 'Minoan Halls: A Syntactical Genealogy'. *American Journal of Archaeology* 117.3: 303–51.

Mackenzie, D. 1904. 'The Successive Settlements at Phylakopi in Their Aegeo-Cretan Relations'. In *Excavations at Phylakopi in Melos Conducted by the British School at Athens*, edited by T. D. Atkinson. London: Macmillan: 238–72.

Marinatos, N. 1984. *Art and Religion in Thera: Reconstructing a Bronze Age Society*. Athens: D. & I. Mathioulakis.

Marinatos, N. and R. Hägg. 1986. 'On the Ceremonial Function of the Minoan Polythyron'. *Opuscula Atheniensia* 16: 57–73.

Marinatos, N. and L. Morgan. 2005. 'The Dog Pursuit Scenes from Tell el Dab'a and Kea'. In *Aegean Wall Painting: A Tribute to Mark Cameron*, edited by L. Morgan. London: British School at Athens: 119–22.

Marketou, T. 1988. 'New Evidence on the Topography and History of Prehistoric Ialysos'. In *Archaeology in the Dodecanese*, edited by S. Dietz and I. Papachristodoulou. Copenhagen: National Museum of Denmark, Department of Near Eastern and Classical Antiquities: 27–33.

Marketou, T. 1998. 'Excavations at Trianda (Ialysos) on Rhodes: New Evidence for the Late Bronze Age I Period'. *Rendiconti dell'Accademia dei Lincei* 9: 39–82.

Marketou, T. 2009. 'Ialysos and Its Neighbouring Areas in the MBA and LB I Periods: A Chance for Peace'. In *The Minoans in the Central, Eastern and Northern Aegean—New Evidence*, edited by C. F. Macdonald, E. Hallager, and W.-D. Niemeier. Athens: Danish Institute at Athens: 73–96.

Marketou, T. 2010. 'Dodecanese'. In *The Oxford Handbook of the Bronze Age Aegean*, edited by E. H. Cline. Oxford: Oxford University Press: 762–74.

Marketou, T. 2014. 'Time and Space in the Middle Bronze Age Aegean World: Ialysos (Rhodes), a Gateway to the Eastern Mediterranean'. In *Space and Time in Mediterranean Prehistory*, edited by S. Souvatzi and A. Hadji. London: Routledge: 176–95.

McEnroe, J. C. 1982. ‘A Typology of Minoan Neopalatial Houses’. *American Journal of Archaeology* 86.1: 3–19.

Momigliano, N. 2005. ‘Iasos and the Aegean Islands before the Santorini Eruptions’. In *EMPORIA: Aegeans in the Central and Eastern Mediterranean* (Aegaeum 25), edited by R. Laffineur and E. Greco. Liège: Université de Liège: 217–25.

Momigliano, N. 2007. ‘Kamares or Not Kamares? This is [Not] the Question. Southeast Aegean Light-on-Dark (LOD) and Dark-on-Light (DOL) Pottery: Synchronisms, Production Centres, and Distribution’. In *Middle Helladic Pottery and Synchronisms,* edited by F. Feltens, W. Gauss, and R. Smetana. Vienna: Österreichischen Akademie der Wissenschaften: 257–72.

Momigliano, N. 2009. ‘Minoans at Iasos?’. In *The Minoans in the Central, Eastern and Northern Aegean—New Evidence*, edited by C. F. Macdonald, E. Hallager, and W.-D. Niemeier. Athens: Danish Institute at Athens: 121–37.

Morgan, L. 1990. ‘Island Iconography: Thera, Kea, Milos’. In *Thera and the Aegean World III:1. Archaeology*, edited by D. A. Hardy. London: Thera Foundation: 252–66.

Morgan, L. 1998. ‘The Wall Paintings of the North-East Bastion at Ayia Irini, Kea’. In *Kea-Kythnos: History and Archaeology*, edited by L. G. Mendoni and A. Mazarakis-Ainian. Athens: Research Centre for Greek and Roman Antiquity, National Hellenic Research Foundation: 201–10.

Morgan, L. Forthcoming. *Keos XI. Ayia Irini. The Wall Paintings of the Northeast Bastion: Social Context and the Miniature Frieze.* Philadelphia, PA: INSTAP Academic Press.

Morgan, L. and M. Cameron. 2007. ‘The Painted Plasters and Their Relation to the Wall Paintings of the Pillar Crypt’. In *Excavations at Phylakopi in Melos 1974–77*, edited by C. Renfrew, N. Brodie, C. E. Morris, and C. Scarre. London: British School at Athens: 371–99.

Nikolakopoulou, I. 2007. ‘Aspects of Interaction between the Cyclades and the Mainland in the Middle Bronze Age’. In *Middle Helladic Pottery and Synchronisms*, edited by F. Feltens, W. Gauss, and R. Smetana. Vienna: Österreichischen Akademie der Wissenschaften: 347–59.

Nikolakopoulou, I. 2009. ‘Beware Cretans Bearing Gifts: Tracing the Origins of Minoan Influence at Akrotiri, Thera’. In *The Minoans in the Central, Eastern and Northern Aegean—New Evidence*, edited by C. F. Macdonald, E. Hallager, and W.-D. Niemeier. Athens: Danish Institute at Athens: 31–9.

Overbeck, J. C. 1989. *Keos VII. Ayia Irini: Period IV. The Stratigraphy and the Find Deposits*. Mainz-am-Rhein: Philipp von Zabern.

Overbeck, J. C. 2007. ‘The Middle Bronze Age Sequences of Kea and Aegina’. In *Middle Helladic Pottery and Synchronisms*, edited by F. Feltens, W. Gauss, and R. Smetana. Vienna: Österreichischen Akademie der Wissenschaften: 339–46.

Palyvou, C. 1986. ‘Notes on the Town Plan of Late Cycladic Akrotiri, Thera’. *Annual of the British School at Athens* 81: 179–94.

Palyvou, C. 1990. ‘Architectural Design at Late Cycladic Aktoriti’. In *Thera and the Aegean World III.1: Archaeology*, edited by D. A. Hardy. London: Thera Foundation: 44–56.

Palyvou, C. 1999a. *Ακρωτήρι Θήρας: Η Οικοδομική Τέχνη*. Athens: *Αθήναις Αρχαιολογικής Εταιρείας*.

Palyvou, C. 1999b. 'Theran Architecture through the Minoan Looking Glass'. In *Meletemata: Studies in Aegean Archaeology Presented to Malcolm H. Wiener as He Enters His 65th Year* (Aegaeum 20), edited by P. P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier. Liège: Université de Liège: 609–16.

Papagiannopoulou, A. G. 1991. *The Influence of Middle Minoan Pottery on the Cyclades*. Göteborg: Paul Aströms Forlag.

Petruso, K. M. 1992. *Keos VIII. Ayia Irini: The Balance Weights: An Analysis of Weight Measurement in Prehistoric Crete and the Cyclades*. Mainz-am-Rhein: Philipp von Zabern.

Raymond, A. 2007. 'Minoanization at Miletus: The Middle Bronze Age Ceramics'. In *Krinoi kai Limenes: Studies in Honor of Joseph and Maria Shaw*, edited by P. P. Betancourt, M. C. Nelson, and H. Williams. Philadelphia, PA: INSTAP Academic Press: 221–9.

Renfrew, C., N. Brodie, C. E. Morris, and C. Scarre (eds). 2007a. *Excavations at Phylakopi in Melos 1974–77*. London: British School at Athens.

Renfrew, C., C. Scarre, T. Whitelaw, and N. Brodie. 2007b. 'The Excavated Areas'. In *Excavations at Phylakopi in Melos 1974–77*, edited by C. Renfrew, N. Brodie, C. E. Morris, and C. Scarre. London: British School at Athens: 19–90.

Schoep, I. 2010. 'Making Elites: Political Economy and Elite Culture(s) in Middle Minoan Crete'. In *Political Economies of the Aegean Bronze Age*, edited by D. J. Pullen. Oxford: Oxbow Books: 66–85.

Schofield, E. 1982a. 'The Western Cyclades and Crete: A "Special Relationship"'. *Oxford Journal of Archaeology* 1.1: 9–25.

Schofield, E. 1982b. 'Plus and Minus Thera: Trade in the Western Aegean in Late Cycladic I–II'. In *Temple University Aegean Symposium: A Symposium Sponsored by the Department of Art History, Temple University, with the Theme 'Trade and Travel in the Cyclades during the Bronze Age', Friday, March 5, 1982*, edited by P. P. Betancourt. Philadelphia, PA: Department of Art History, Temple University: 9–13.

Schofield, E. 1983. 'The Minoan Emigrant'. In *Minoan Society*, edited by O. Krzyszkowska and L. Nixon. Bristol: Bristol Academic Press: 293–301.

Schofield, E. 1984. 'Coming to Terms with Minoan Colonists'. In *The Minoan Thalassocracy: Myth and Reality. Proceedings of the Third International Symposium at the Swedish Institute in Athens, 31 May–5 June, 1982*, edited by R. Hägg and N. Marinatos. Stockholm: Svenska institutet i Athen: 45–8.

Schofield, E. 1990. 'Evidence for Household Industries on Thera and Kea'. In *Thera and the Aegean World III:1. Archaeology*, edited by D. A. Hardy. London: Thera Foundation: 201–11.

Schofield, E. 1998. 'Town Planning at Ayia Irini, Kea'. In *Kea-Kythnos: History and Archaeology*, edited by L. G. Mendoni and A. Mazarakis-Ainian. Athens: Research Centre for Greek and Roman Antiquity, National Hellenic Research Foundation: 117–22.

Schofield, E. 2011. *Keos X. Ayia Irini: The Western Sector*. Mainz-am-Rhein: Philipp von Zabern.

Shaw, J. W. 1978. 'Consideration of the Site of Akrotiri as a Minoan Settlement'. In *Thera and the Aegean World I*, edited by C. G. Doumas. London: Thera Foundation: 429–36.

Shaw, J. W. 2009. *Minoan Architecture: Materials and Techniques*. Padua: Aldo Ausilio.

Shaw, J. W. 2011. 'Tracing the Ancestry of the Minoan Hall System'. *Annual of the British School at Athens 106*: 141–65.

Soles, J. S. 1991. 'The Gournia Palace'. *American Journal of Archaeology* 95.1: 17–78.

Vitale, S. and T. Hancock. 2010. 'The Minoan and Mycenaean Expansion in the Dodecanese: The Evidence from the "Serraglio" on Kos and Its Theoretical Implications'. In *Migration in Bronze and Early Iron Age Europe*, edited by K. Dzleglelewski, M. S. Przybyla, and A. Gawlik. Krakow: Jagiellonian University, Institute of Archaeology: 63–85.

Vitale, S. and T. Hancock. 2013. 'The Minoans in the South-Eastern Aegean? The Evidence from the "Serraglio" on Kos and Its Significance'. In *Exchange Networks and Local Transformations: Interaction and Local Change in Europe and the Mediterranean from the Bronze Age to the Iron Age*, edited by M. E. Alberti and S. Sabatini. Oxford: Oxbow Books: 44–59.

Whitelaw, T. 2004. 'The Development of an Island Centre: Urbanization at Phylakopi on Melos'. In *Explaining Culture Change: Studies in Honour of Colin Renfrew*, edited by J. F. Cherry, C. Scarre, and S. J. Shennan. Cambridge: Cambridge University Press: 149–66.

Whitelaw, T. 2005. 'A Tale of Three Cities: Chronology and Minoanisation at Phylakopi in Melos'. In *Autochthon: Papers Presented to O.T.P.K. Dickinson on the Occasion of his Retirement*, edited by A. Dakouri-Hild and S. Sherratt. Oxford: British Archaeological Reports: 37–69.

Wilson, D. E. 1999. *Keos IX. Ayia Irini: Periods I–III. The Early Neolithic and Early Bronze Age Settlements, Part 1: Pottery and Small Finds.* Mainz-am-Rhein: Philipp von Zabern.

15

A Comparative Perspective on Minoan Urbanism

Quentin Letesson, Carl Knappett, and Michael E. Smith

15.1. INTRODUCTION

Urban settlements are often presented as a prominent feature of Bronze Age Crete (McEnroe 2010). And yet, summarizing what is actually known about Minoan towns is much more challenging than one would expect, especially for non-palatial settlements. Many studies are narrowly focused and often take one urban element out of context in all communities (e.g. villas, classification of houses, street system, etc.), hence undermining an understanding of the urban environment as a whole. Furthermore, research on Minoan urban contexts has long been characterized by a strong focus on polite or palatial architecture and very specific urban features related to it (such as the so-called west courts, raised walks, theatral areas, etc.), while most case-studies have often had a rather limited dataset. There are clearly exceptions but, to date, our knowledge of Minoan urban settlements is partly built on a large collection of heterogeneous and disparate information. As already noted some fifteen years ago, the 'nature and character' of urban settlements 'has seen much less discussion, particularly at a generalized level' (Branigan 2001a: vii; but see chapters 7 and 9).

Of course, this situation is also inextricably linked to the nature of our datasets. Research is clearly constrained by the low quality of work in the initial decades of Minoan archaeology when so many of the larger exposures of townscapes on the island were made. And yet, for more than a century now, the archaeology of Bronze Age Crete has thrived: many excavations initiated at the beginning of the twentieth century have either continued or been revived, providing descriptions of numerous settlements of various sizes; new projects have unearthed fascinating buildings and sites; and many regions of the island have now been systematically surveyed. As a consequence, Minoan archaeologists have at their disposal a solid and varied dataset. Of course, sampling issues do exist.

Firstly, remains of Neopalatial urban settlements clearly outnumber those of other periods. Secondly, even if we have good settlement remains from Pre- (e.g. Myrtos Fournou Korifi, and perhaps even Vasiliki and Trypiti), Proto- (most notably Malia), and Postpalatial times (e.g. Haghia Triada, Kavousi Vronda, Monasteraki Halasmenos, Karphi), most of them barely qualify as urban environments (McEnroe 2010). Of course, studying them is nonetheless essential if we want to understand the evolution of Minoan urbanism. Thirdly, although the resolution we can hope for in the archaeological record has certainly improved through the recent publication of various excavations and surveys, the extent to which various settlements are preserved inevitably varies. For example, although settlements like Gournia and Palaikastro (Fig. 15.1; see also chapters 3 and 9), excavated at the beginning of the twentieth century when extensive excavation projects were the norm, illustrate well the degree of variation in the layout of Minoan towns, other sites, including the major palatial sites (Knossos, Malia and Phaistos), were typically excavated in a piecemeal fashion over several decades and consequently have detailed plans of particular urban areas but no good quality plan of their general urban layout.

We believe that one way to compensate for this sampling problem would be to mobilize our datasets in comparative approaches, both between Minoan settlements of various types and with other Bronze Age (e.g. in the Near East; see chapters 7 and 13) or ancient towns. If comparisons between sites in Minoan Crete are not numerous, cross-cultural comparisons are even less frequent. Some references do exist but they usually remain of limited scope

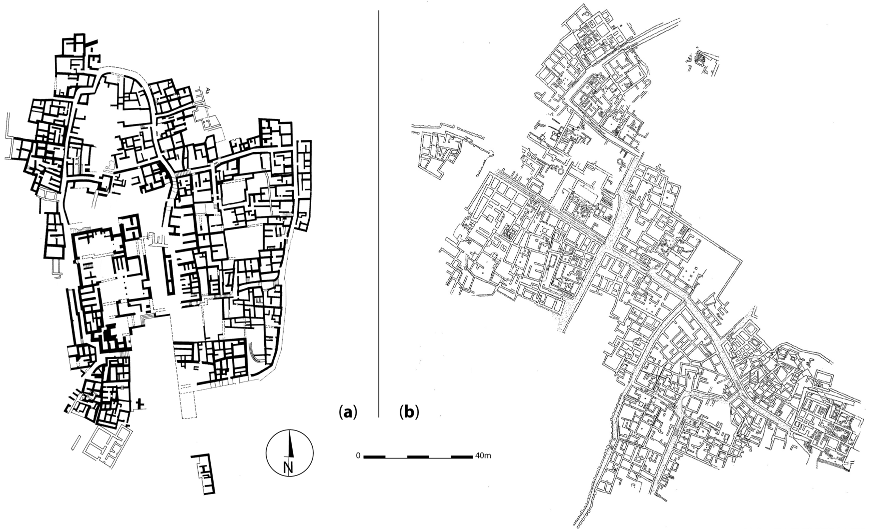

Fig. 15.1. Plan of (a) Gournia and (b) Palaikastro (respectively adapted from Myers et al. 1992: 106, fig. 13.1 and MacGillivray et al. 2000: 22, fig. 1.1).

(Branigan 2001b: 41–2 and 48–9; Palyvou 2009: 71; Whitelaw 2001: 27–32, figs 2.10–11). Although, as Whitelaw (2001: 27) argued, we should not treat the urban phenomenon in the Aegean as a unitary process, cross-cultural comparisons could actually allow us to better comprehend both recurring patterns and potential influences as well as, quite probably, Minoan idiosyncrasies.

In this concluding chapter we therefore propose to evoke the characteristics that are often attributed to Minoan towns, with twin goals in mind. First, although our account does not fully detail how each urban feature or process was identified or discussed, it is, to our knowledge, the first attempt to provide a comprehensive list of these characteristics and to point towards the relevant literature. Secondly, by sorting them according to Rapoport's (1988, 1990) model of levels of meaning in the built environment, we aim to emphasize the type of research questions that can be reasonably investigated with the data we have at our disposal. Thirdly, we also seek to integrate recent studies on demography and settlement patterns within Rapoport's model, as they are the subject of some of the most promising research on the urbanization of Minoan Crete (see also chapters 7 and 12). In parallel, we also briefly present comparative material and hint at theoretical and methodological approaches that could serve as guidelines for future research in Minoan urbanism.

15.2. CONCEPTUAL FRAMEWORK

Amos Rapoport's (1988, 1990) model of three levels of meaning in the built environment provides a useful way to organize our comparative discussion of Minoan urbanism. The focus on *meaning* is crucial.[1] Rapoport's model is not a theory of urbanism, but rather a framework for describing the varied ways in which humans interact with the built environment, and the different kinds of messages that are communicated to people by the built environment. Table 15.1 is an outline of Rapoport's model; for more discussion see Smith (2007).

Rapoport's low-level meanings describe the recursive relationship between the actions of people and the built environment. 'People read environmental cues, make judgments about the occupants of settings, and then act accordingly' (Rapoport 1990:139). For Rapoport, residents do not just inhabit a city; they give it meaning through their activities and their movement within it. The ways that built environments and human activities shape one another conform to universal patterns, which are expressed individually in particular cultures and particular settings. These patterns include movement, access to spaces, privacy, and expected behaviour. In this chapter we examine the topics of typo-morphology, urban structure, and town planning under the heading of low-level meaning.

Middle-level meanings describe the deliberate patterns of communication from the builders of architecture to users and viewers. Although not necessarily

Table 15.1. Levels of meaning in the built environment (source: Rapoport 1988, 1990).

	Low	Middle	High
Domain	How people use the built environment	Communication of social and political messages	Religious symbolism
Audience for messages	All users	Subjects of the regime and potential subjects	Literate elite
Universality	Universal, cross-cultural	Almost universal	Culturally specific
Themes	Movement	Power	Cosmology
	Access	Identity	Mythology
	Privacy	Status	World-view
	Expected behaviour	Durability	The sacred

universal among cultures, the basic middle-level messages of buildings can often be reconstructed and interpreted without extensive knowledge of their specific cultural setting. For example, very large buildings communicate power, wealth, and durability, and archaeologists can read these meanings from past societies without need for written documentation. Monumentality is thus one category of middle-level meanings that has been extensively analysed by archaeologists (Trigger 1990). These meanings were transmitted initially by kings and elites, and we can continue to read them today. Public buildings may also transmit messages about political and social identity (Smith 2008).

High-level meanings describe specific symbolism, usually of a religious nature. Myths, cosmological precepts, and ideas about sacred world-views may be encoded in buildings or cities. As described by Rapoport, these messages are often esoteric, and may be understandable to only a few literate members of the elite. They are almost always culturally specific. Thus if one is not a member of a particular culture or religious group, then high-level meanings may not be decipherable. While many archaeologists wish to analyse ancient high-level meanings (Pearson and Richards 1994), in fact these may be inaccessible to modern scholars in cases without detailed written texts (Blanton 1995; Smith 2003).

15.3. LOW-LEVEL MEANINGS IN THE MINOAN BUILT ENVIRONMENT

15.3.1. Navigation of Domestic Space

Letesson (2015) has applied Rapoport's model of low-level meaning to Minoan contexts. With an emphasis on the micro-scale of architectural installations, he analyses how such installations, and particularly fixed hearths and kernoi, might have 'played a pivotal role with regard to how Minoans navigated built space' (Letesson 2015: 717). Critiquing a common overemphasis in Minoan architectural studies on middle- and high-level meanings—such as the monumental facades of the west courts, or the cosmological basis for the central courts' orientations—Letesson instead urges a focus on the low-level meanings emergent from everyday interactions within the built environment.

Letesson's study is an effective means for rendering dynamic specific features in the built environment. This focus on meaning-making helps to make architecture dynamic because it obliges us to think about interactions, both in terms of makers and users. It is, however, just a first step. Other micro-architectural features (e.g. benches, thresholds, wall decoration) need to be subjected to similar treatment. Moreover, while such features can be analysed in their position within buildings using space syntax analysis, as Letesson (2009, 2013, 2015) notably does for Neopalatial architecture generally, we also need to think about low-level meanings beyond house interiors. How is the meaning of houses affected by their spatial relationships within townscapes, with particular alignments of streets and courts providing low-level meanings? These are some of the issues we now address, by way of expanding Rapoport's scheme to other dimensions of the Minoan built environment.

Although features of the Minoan built environment are here organized according to the model summarized in Table 15.1, boundaries between levels of meanings are presumably much more flexible. An argument could even be made that they actually are interconnected and inform one another. Therefore, in the following sections, we also hint at potential articulations between levels of meanings. In so doing, we believe that the dynamics of built environments—or, to put it differently, their *nested semiogenesis*—could be traced more efficiently in the future, especially in a comparative perspective.

15.3.2. Typo-Morphology

If we seek to extend a typo-morphological approach—the detailed description of a whole range of urban forms and their properties (morphology) and the subsequent identification of common characteristics and recurrent patterns across them (typology)—beyond individual buildings to the broader organizational and contextual features, where might we begin? The existence of a *concentric organization* is one of the most frequently discussed morphological properties of Minoan urban environments. Originally developed by Evans (1928: 560–3), this model hypothesizes that Minoan towns can be schematized as radiating from a monumental—often but not always palatial—central core with urban areas becoming more and more modest architecturally and organizationally the further away they are from the centre. This is an example of the concentric zonation posited by Sjoberg (1960) for pre-industrial cities in general. While many scholars agree that Sjoberg's concentric model is useful as a generalized description of pre-modern cities in many areas (Herbert and Thomas 1997: 22–7; Faust 2003; Cowgill, Altschul, and Sload 1984), tests of the model as a strict geometric arrangement of discrete zones have generally rejected the scheme (e.g. Arnold and Ford 1980).

Although no Minoan scholar has argued for a strict concentric ring model, the centripetal tendency of streets and buildings to cluster around the monumental urban core, with a propensity for high quality architecture in the inner areas, is clear at many palatial and non-palatial sites (Branigan 1972: 756–7; 2001b: 45; Hutchinson 1950: 206–7; van Effenterre 1980: 270; Whitelaw 2001: 24–7; 2004: 153). Concentric organization can indeed generate low-level meanings, as the decreasing formalization of peripheral areas can trigger different patterns of movements and spatial behaviours but could also convey notions of social differentiation or political affiliation (see section 15.4).

A second formal property often highlighted is the *aggregative nature* of Minoan urbanism—that is, the gradual development of contiguous buildings or progressive addition of new parts to existing structures, a tendency that developed since the Neolithic and formed the 'basic canon of settlement layout' (Hutchinson 1950: 200–3; Palyvou 2009: 72). This type of development relates to a high density in built forms in turn, often but not always connected with demographic pressure, especially for the Proto- and Neopalatial periods when the phenomenon seems to have been particularly strong (Branigan 1972: 756; McEnroe 1979: 329–31; Whitelaw 2001). During the Neopalatial period, this agglutinative process even started to impinge on streets and open spaces (Gomrée 2013: 939; Platon 1990: 392). Whitelaw (2012: 150) noted that 'dense agglomerate architecture appears to be a general Bronze Age Cretan cultural pattern' and that, in a way, density might well have been 'culturally accepted rather than locally topographically-determined'.

This kind of spatial patterning is widespread in ancient times. Scholars of ancient housing have identified two types of pre-modern housing construction: agglutinated and internally subdivided (Rapoport 1969: 36; Cerasi 1998). In the former (which characterized Minoan cities), houses and house lots expand gradually by adding rooms and spaces without central control; in the latter, urban houses and house lots are first laid out by a central authority, and then they are subdivided internally. The latter approach to house construction is well known from Classical Greek and many Roman cities, but the former Minoan approach was probably more common in the ancient world. The most detailed analyses are for Ottoman housing in the Levant (Hakim 1986; Behar 2003: 45–6).

Insulae or *blocks* are discrete portions of the urban fabric or plots delineated by streets and are usually described as relatively irregular in shape and size, with recesses breaking up their outlines (Palyvou 1986). Attested since the beginning of the twentieth century with the large scale excavation of Palaikastro, these blocks are considered an essential characteristic of Minoan urban morphology (Branigan 1972: 756; Chryssoulaki 1990: 371–5; McEnroe 1979: 332–7; Platon 1990: 384). Within such blocks, buildings of various size and elaboration could coexist, a phenomenon usually attributed to 'the filling up of available spaces by smaller buildings' (McEnroe 1979: 335) in the agglutinative process previously described.

Another basic feature of Minoan urbanism is the prominence of *neighbourhoods* or *quarters* (Smith 2010a; see also Buell 2014). On present evidence, scholars agree on the existence of a civic monumental sector, residential areas and, for certain sites, artisans' quarters. Whitelaw (2004: 153) estimates that in Gournia, the civic/administrative sector (i.e. the palace) occupied 3.5 per cent of the overall area of the site; public spaces (i.e. streets and open areas), around 22.5 per cent; and residential neighbourhoods, the remaining 74 per cent. These ratios might certainly vary with larger sites and what is interesting, in the overall pattern, is that such sites with more producers could support commensurately larger central facilities, so these potentially scale. The possible existence of specialized artisans' neighbourhoods has been discussed in the literature, but their importance and role have been difficult to understand. Such neighbourhoods were present in both the Proto- and Neopalatial periods, respectively with Quartier Mu and its Maisons-Ateliers (Poursat 1996), and the buildings excavated on the shore facing the islet of Mochlos (Soles 2003). Referring to 'the scattered distribution of workshops in the town of Zakros, and the evidence for small-scale "cottage industries" at Gournia, Poros and Kommos', Whitelaw (2001: 24) nonetheless argued that 'the large-scale economic zonation identified at some ancient urban sites would not appear to be a strong structural component of Minoan urbanism'.

Where spatial aggregation, blocks, and neighbourhoods are concerned, urban environments have to be considered both in terms of bounded areas (differentiation of spaces) and circulation 'grids' (transition between spaces), as argued by Palyvou in chapter 5. The interplays between the two components need to be clarified if one is to understand the 'complexity of spatialization' of town and cities (see section 15.3.3). In that regard, creating boundaries between different spatial entities certainly impacts the use of space (low-level meaning) but can also express differences in social identities, group status or gender-related practices (middle-level meanings; see chapters 5 and 9). In turn, this organizational logic can be rooted in particular worldviews permeating the built environment (see section 15.5).

Two types of *public spaces* are also presented as major components of the Minoan urban fabric: west courts and streets. Although its accessibility was particularly high (Letesson and Driessen 2008), the central court of palaces, a completely enclosed space, was not a public space per se (see Palyvou 2004). The west courts though were tightly connected to the urban fabric. They formed a kind of buffering area between the town and palaces while serving as gathering spaces for the urban population (Preziosi 1983; Palyvou 2004; Letesson and Vansteenhuyse 2006). It has been argued that they constituted the core of the whole urban world (Damiani-Indelicato 1982; Driessen 2004, 2009; Letesson and Driessen 2008; van Effenterre 1963, 1980) and that it was their formalization and architectural elaboration that epitomized the urban phenomenon, making 'towns out of Minoan villages' (Driessen 2009: 41). So, although the morphological properties of such courts have clear implications in terms of low-level meanings (i.e. they testify to particular uses of space), their distinctiveness in certain contexts certainly also conveys middle-level notions such as, for example, the importance of communality (see section 15.5).

Streets are a second major type of public open space in Minoan settlements. It has been argued that their formalization, often at the beginning of the Protopalatial period, played a crucial role in the constitution of the urban fabric (Chryssoulaki 1990; Palyvou 1986). Recently Gomrée (2013: 828–9) argued that the long principal street that can indeed be found in several settlements is better considered the backbone of the whole street network than the actual first stage of the urban development. Based on her analysis of Akrotiri, Palyvou (1986) proposed a typology/hierarchy of streets. She identified main streets 'primarily meant to carry all the traffic through and within the settlement', secondary streets which accommodated local needs in terms of circulation, narrow alleys that were probably not 'intended for traffic' but rather provided light, air, and drainage facilities and, finally, blind alleys or cul-de-sacs that were intended for ventilation and illumination only (Palyvou 1986: 185–9; 2005: 29–34). In most pre-modern cities, streets were not only transportation features; they also served as important spaces for people to gather and interact informally (Celik et al. 1994; Xie 2012). It would not be surprising if this were a function of Minoan streets as well (see Gomrée 2013), although this idea is difficult to verify.

Apart from streets and west courts, public open spaces were uncommon in the Proto- and Neopalatial urban environment (Branigan 1972: 758; Cunningham 2001: 80–1; Platon 1990: 391–3). Although the aggregative nature of Minoan urbanism certainly contributed to the apparent lack of clearly identifiable public spaces in several settlements, Palyvou (2004: 207) noted that 'the very essence of Minoan architecture lies in the rich scale of in-between [...] it provides'. Indeed, beyond squares and streets, many other types of open-air spaces existed in the Minoan urban fabric, as illustrated by the spectrum of outdoor spaces discussed by Palyvou (2004).

Another distinctive formal property of Minoan urban environments the meaning of which has never been truly tackled—beyond Evans's *pax minoica*—is the *absence of fortifications*. Although few examples of potential stretches of fortification exist at Malia (van Effenterre 1980: 94, 266), Gournia

(Watrous 2012), Petras (Tsipopoulou 1997: 269), Palaikastro (MacGillivray et al. 1984), or Sissi (Driessen et al. 2011: 172–6), there is no evidence in Minoan Crete of a 'complete circuit' of defensive walls as in many contemporary towns in Palestine, Syria, Mesopotamia, or Anatolia (Branigan 2001b: 43).

15.3.3. Urban Structure

When we move beyond typo-morphology, which describes the physical constituents of the urban environment, to consider the overall spatial configuration—the ways in which buildings, streets, and open spaces relate to one another and create opportunities for movement, occupation and interaction—then we are shifting scale to an analysis of urban structure. Although Palyvou (2009: 71) stated that 'a tight dialectical relationship between open and closed space [was] the cornerstone of Minoan Urban Planning' (see also McEnroe 2010: 67), until recently (see chapter 8) the issue of urban structure remained implicit in her work. Furthermore, rather than considering entire street systems, scholars often focused on particular features, such as the so-called raised walkways found in palatial sites (Driessen 2004, 2009; Palyvou 2004; Letesson and Vansteenhuyse 2006).

In his comparison of the layouts of Petras, Zakros, and Palaikastro, Cunningham (2001) was the first to develop an explicit approach to urban spatial configuration in Minoan Crete. On the basis of space syntax concepts, he considered both the street layout in itself but also its articulation with the buildings opening on to it. More specifically, he underlined the high degree of axiality of the street system at Palaikastro, in contrast with that of Zakros which shows a much more intricate pattern (Cunningham 2001: 78–81). Following Hillier (1996: 313–27), he equated this axiality with intelligibility which measures the extent to which the layout of an urban environment can be understood, and hence navigated, from what is immediately visible from a given spot. Originally coming from Gibson's (1979) visual affordance, this isovistic approach to the navigation of space, and the idea that the available walkable surface that we perceive contributes to trigger pedestrian movement, is now well accepted (Hillier et al. 1993; Turner and Penn 2002). In Cunningham's argument, this idea is given a particular twist. According to him, because they offered longer, unblocked lines of vision, and were therefore more intelligible, the streets of Palaikastro may have been designed to accommodate (asides the needs of the local community) the circulation of a higher proportion of visitors than those of Zakros. For Cunningham, this testifies to different social matrices and a more homogenous community at Zakros. Although these somewhat speculative interpretations will be difficult to confirm or reject without additional evidence, investigating other Minoan urban layouts through space syntax could provide a valuable comparative basis. The latter could also be expanded by considering several recent studies that have analysed ancient cities through this methodology (e.g. Griffiths 2012; van Nes 2014).

Again, as suggested by Cunningham's argument, addressing how components of the built environment are articulated within the urban fabric can certainly allow us to go beyond patterns of movement, accessibility, and expected behaviours and lead to hypotheses pertaining to middle-level meanings (e.g. status, identity, power) that could be tested in various settlements (see, for example, chapter 9).

15.3.4. Town Planning

Considerations of urban forms and structure have occasionally led to the issue of town planning. Branigan (2001b: 38) suggested that 'even when attempts have been made to discuss the towns as a whole, attention has been focused on matters of architecture rather than on how the town was organized, or indeed whether, in the strict sense of the term, the town was "organized" at all'. Furthermore, a strong polarization between unplanned and planned pervades the few existing accounts. From very early, the agglutinative tendency attested in the architecture was equated with organic growth (Damiani-Indelicato 1984: 52; Hutchinson 1950: 200–1), the fact that additions were made somewhat haphazardly to existing structures when the additional space was needed rather than according to a pre-existing conception or organizational model. For some scholars, this process resulted in the 'untidy appearance' or 'unruly look' of many Minoan settlements, or at least of parts of them, especially before the Neopalatial period (Branigan 1972: 756; McEnroe 1979: 297; Poursat 1988: 74). This is partly due to the fact that, as has been the case for Minoan architecture considered at first labyrinthine and somewhat irrational, most scholars of the first half of the twentieth century saw the street layout and overall configuration of Minoan towns as totally disorganized, especially when compared with the orthogonal layout of ancient Greek cities. But the fact that Minoan residential neighbourhoods grew in an agglutinative pattern does not mean that other aspects of the cities were not planned.

From the perspective of current understandings of town planning in ancient cities (Smith 2007), it is clear that Minoan cities exhibited a number of attributes of planning (Buell 2015). Smith's model has two parts: coordination among buildings and spaces, and standardization among cities. In terms of coordination, these cities shared with many other urban traditions a pattern in which central architecture—in the current case, the palace—is carefully planned and laid out, while residential zones show a lower level of coordination among buildings. The major towns are clearly oriented around the palace, with streets and raised walkways serving to integrate the diverse parts of the city (see chapter 8). While these patterns signal a lower level of overall planning than the orthogonal layouts of Classical Greek cities, they do provide evidence for a deliberate attempt to link parts of the city together. For the question of standardization among cities, many Minoan towns do have a common set of buildings (the architectural inventory), and the overall spatial layouts—as discussed in section 15.3.3—show a low level of standardization. While no two Minoan towns were identical, their attributes suggest the presence of a basic concept of specific elements and layouts that were needed to be a town. If palaces and other types of central buildings were of great importance, the integration of other features (courts, street junctions, stepped areas, raised walks, blocks, etc.) in the urban matrix as elements of planning certainly deserve to be properly investigated. Again, as discussed by Whitelaw (see chapter 7), comparisons with contemporary Bronze Age towns can be extremely instructive in that regard.

As outlined in section 15.3.2, beyond the possibility of tracing human interactions with built space (low-level meanings), addressing the issue of town planning clearly invites us to consider the middle-level meanings of the built environment and, provided that these are investigated systematically, could even shed some light on high-level meanings in Minoan society.

15.3.5. Low-Level Meanings at the Regional Level? Demography and Settlement Patterns

Although the density of occupation—often triggered by the concentration of people in space (i.e. demography)—and the distribution of agglomerations across the landscape are not part of Rapoport's model, both are actually part of the built environment and can constrain or facilitate particular access or circulation patterns as well as frame expected behaviours. In other words, if we can think about low-level meanings at the scale of the urban environment as a whole, why not extend the scale of analysis further, and think about the distribution of socio-material interactions across wider landscapes and regions? For example, we do not see a single town emerge on Crete, but a number of them together—which surely implies some shared low-level meanings as to how many people it was acceptable to live in close proximity with, as population levels rose and aggregation became a growing factor as villages turned into towns during the Protopalatial period (Branigan 1972: 752; Hutchinson 1950: 206; Poursat 1988: 73; van Effenterre 1980: 94), a process that, as Whitelaw (2012) argued, actually already started in the late Prepalatial period. Quite logically, this population growth was often related to a higher density of buildings in Minoan settlement (e.g. Chryssoulaki 1990; McEnroe

1979: 330; Palyvou 2009). Apart from a wide range of figures proposed for Knossos (discussed and summarized in Whitelaw 2004: 147–50), Whitelaw (2001: 15) noted that population estimates were often regarded as particularly dubious inferences by Aegean prehistorians (see also Manning 1999: 473). A turning point in the study of settlement and population size in the Aegean was reached with Renfrew's ground-breaking work (Renfrew 1972: 225–64). His analyses and estimates confirmed the demographic explosion at the beginning of the Middle Bronze Age (Renfrew 1972: 249–55, figs 14.11 and 14.12) but he was reluctant to admit that any major Minoan site might have been larger than 4 ha, considering them, at best, as 'small towns' (Renfrew 1972: 238–40; see Whitelaw 2001: 27–31; and Whitelaw 2004: 150 for a critical evaluation).

Detailed approaches to settlement size and density are not common in recent Minoan scholarship. Although Manning's (1999) application of some of the principles developed by Fletcher (1995) in his seminal book *The Limits of Settlement Growth* to the evolution of Knossos is worth noting,[2] to date the most detailed and critical approach to Minoan *demography* has been produced by Todd Whitelaw in a series of strongly articulated papers (Whitelaw 2001, 2004, 2012). In the first two papers, Whitelaw adopted the same approach, producing population estimates on the basis of typo-morphological considerations. First, highlighting a standardization in size in Minoan residential buildings, he postulated the existence of nuclear or minimally extended stem families of four to five individuals (Whitelaw 2001: 17–21; 2004: 152), a type of household that, according to him and drawing on examples from Early Minoan to Late Minoan I periods, would have been the norm and the basic social and residential unit in prehistoric Crete (see chapter 5 for an alternative interpretation).

Secondly, to infer population density from household size, Whitelaw assessed the distribution of residential buildings of various sizes—which he basically considered indicative of wealth—and the percentage of urban areas that are devoted to housing rather than administrative areas or open spaces (Whitelaw 2001: 21–7; 2004: 152–3). Carefully documenting substantial differences in house size between non-palatial and palatial settlements (Whitelaw 2001: 20), and evoking the difficulty to 'distinguish different overall patterns of behaviour between different sites, from more localized variations within individual sites' (Whitelaw 2001: 22) and the absence of clear formal economic zonation in Minoan settlement (Whitelaw 2001: 24), he nonetheless advocated, especially in the case of Knossos, a centripetal model of density gradients in terms of persons/ha (Whitelaw 2001: 24–7, fig. 2.8). Furthermore, echoing Evans (1928: 560–3), he also linked these 'vaguely definable zones' with different types of housing: the palace at the centre; close to it, a mix of elite residence with quasi-official structures; further away, residences for important individuals and several other residential areas of lesser wealth as one goes towards the margin of the city (Whitelaw 2001: 24; 2004: 153). Both papers also provide comparisons between Neopalatial sites (see especially Whitelaw 2001: 27–9). Because of the limited excavated areas at most sites, these figures are based on site areas rather than on population estimates.

As discussed in section 15.3.2, density gradients and architectural zonation were certainly co-implicated in particular spatial behaviours (e.g. channelling of pedestrian traffic—see chapter 8, controlled accessibility, different types of social interaction, etc.). But, simultaneously, these various zones within the urban fabric probably also manifested some sort of social order (middle-level meaning) in which the relative proximity to the palatial central court might have been symbolically instrumental (Driessen 2004, 2009; high-level meaning).

In his third paper, Whitelaw (2012) addressed the question of the roots of urbanization which he clearly associated with higher population density and associated phenomena such as new forms of social integration through hierarchical organization. First, through an exhaustive analysis of material and architectural distribution, he provided estimates of changing site sizes for Knossos, Malia, and Phaistos from the Neolithic to the end of the Protopalatial period (Whitelaw 2012: 120–46). Subsequently, occupation areas are converted into patterns of population growth. Using population density estimates calculated on the basis of the architectural remains of various Pre- and Protopalatial sites (Whitelaw 2012: 149–50), he illustrated that at Knossos an explosive increase of population certainly started during the Late Prepalatial period and that this exponential pattern continued throughout the Protopalatial period (Whitelaw 2012: 152). This dramatic change would have been integral to major social transformations and given rise to a real urban community (Whitelaw 2012: 152–5). Whitelaw's analyses also show that the same developmental pattern—and arguably the common processes underlying it—is attested both at Malia and Phaistos. Although it is possible that the demographic threshold calling for new forms of social integration might have been reached there slightly later than in Knossos (Whitelaw 2012: 156), the three sites indeed show clear evidence of large-scale construction activities and massive settlement expansion in their hinterland (Whitelaw 2012: 165).

We might also give some thought here to *settlement patterns*, notably the existence or otherwise of site hierarchies—long an area of interest in Minoan scholarship. For example, Sir Arthur Evans paid a lot of attention to roads and how they connected specific settlements both in central and east Crete (Evans 1928: 60–92; see also Warren 1994: 189, n. 3 for references) to support his view of Knossian overarching power. In the sixties, a three-tier hierarchy was clearly advocated by Hood, Warren, and Cadogan with 'great cities' (Knossos, Malia, Phaistos), 'lesser towns' and a 'countryside […] dotted with farms and villas, isolated or in small groups or hamlets of two or three houses' (Hood, Warren, and Cadogan 1964: 52). In *The Emergence of Civilization*, Renfrew (1972: 225–64) provided the first real quantitative approach to settlement patterns on Crete; but it is from the mid-seventies onwards that numerous surveys were conducted and provided invaluable information on road networks (Müller 1991; Tzedakis et al. 1990; Tzedakis et al. 1989) and settlement distribution (for extensive bibliography and synthesis, see Driessen 2001; Whitelaw 2012). Most Minoan scholars today recognize the existence of settlement hierarchies, whether of three (Branigan 2001b: 37–41; Whitelaw 2001: 27; 2004: 153), four (Rackham and Moody 1996: 89), or five levels (Driessen 2001: 60, table 4.2).

Branigan (2001b: 45–8) was probably the first scholar to attempt to give estimates for both rural and urban population in the Neopalatial period. His main conclusion was that a very significant proportion of the population—between 40 and 50 per cent—lived in towns, with a majority of urban-dwellers concentrated in a very small number of large settlements (Branigan 2001b: 48). This is a very high level of urbanization for a pre-modern society in the Old World (Bairoch 1989; Wrigley 1990). In recent scholarship, processes of progressive hierarchization of sites have been proposed. Whitelaw (2012) showed that the late Prepalatial period was the take-off point in the growing control of future palatial settlements such as Knossos, Malia, and Phaistos over their hinterland. Furthermore, he convincingly argued that, at the same period, urban and rural processes were linked, with population expanding concomitantly in both centres and countryside, inviting us to acknowledge that nucleation was certainly not the only factor triggering the noticeable expansion of some settlements (Whitelaw 2012: 160).

Advocating an approach combining computational, comparative, and material approaches, Bevan (2010) provided a solid framework for the diachronic evaluation of settlement patterns (see also chapter 12). Of course, any attempt to consider settlement patterns and regional hierarchies in Minoan times comes up against considerable gaps in our data. This problem was recently tackled by Bevan and Wilson (2013), who devised a complex model for exploring settlement locations, hierarchies, and interconnections despite our incomplete dataset. Bevan and Wilson's (2013) modelling experiments highlighted important consistencies in Minoan settlement patterns: 1) a loose and fragmented landscape of villages progressively clustering in 'regional "peer polities" of comparable size and extent', 2) the existence of a tension between factors playing a crucial role in the rise of important centres, i.e. their proximity to the coast (possibility of off-island links) and their central position on the island and, therefore, in the overall configuration of neighbouring settlements, and 3) the fact that 'power might have further consolidated over time at a single site in the middle of the island [...], as it may well have done at Knossos', a phenomenon 'better construed as an exogenous effect rather than an endogenous one', i.e. more closely related to the control over or significant interactions with a whole configuration of settlements—in Crete and overseas—through actual contacts, commercial exchanges, and administrative practices rather than to the internal properties of the site itself or of its local region (Bevan and Wilson 2013: 2423).

Yet another approach to settlement patterns seeks to take into account the past experience of space. While a settlement hierarchy no doubt resulted in large part from organizational requirements, with first, second, or third order sites located for more or less ‘practical’ reasons, it is also likely that such spaces were experienced differently, with varying occupation densities, circulatory patterns, and means of access. Such variables might then also have generated different kinds of interaction within different orders of the settlement hierarchy—and although such differential behaviours might have been largely cued by low-level meanings, it also seems possible that the built environment might have been directly manipulated with a view to affecting their perceived status in the settlement hierarchy, hence reflecting Bronze Age Cretan socio-political organization. These types of middle-level meanings at the meso- or macro-scale of the built environment deserve our attention. Recently, this interplay between low- and middle-level meanings in the built environment has been addressed—although not using these terms—by Déderix (2017) in her study of the Prepalatial circular tombs of south-central Crete. Through a GIS analysis of focal mobility networks, she conjointly approaches patterns of movement and the particular locations of tombs. These were usually located along optimal circulation paths in the Mesara region (low-level meaning) but also occupied prominent areas, functioning as focal landmarks for neighbouring communities which, in relation to the tombs, expressed their identity through different social strategies (middle-level meaning).

15.4. MIDDLE-LEVEL MEANINGS: MONUMENTALITY, MATERIALIZATION, AND POWER

In Rapoport’s model, middle-level meanings describe the deliberate patterns of communication from the builders of architecture to users and viewers. A more general understanding of this category would cover expressions of power, identity, or status conveyed through the built environment. We explore here issues of monumentality, socio-political organization of urban community, and urban iconography.

15.4.1. Monumentality

As is often the case in archaeological research, *monumentality* in Minoan architecture is seen as both fostering social integration and promoting political power. As defined by Trigger (1990: 119–20), a built form can be termed monumental when its scale and elaboration exceed the requirements of any practical function it is intended to perform. Moore (1996: 139–40), added several other traits to this definition, stressing the fact that monumental structures are generally permanent buildings meant to last over generations and are centrally located in a settlement or away from all residences in an isolated locale. Furthermore, monumental buildings are relatively visible and there is a restricted distribution of such structures in relation to settlements. He also argued that the key to monumental structures was their visual impact and legibility—i.e. their capacity for conveying meaning and the clarity with which that meaning can be read from inside and outside the structure (Moore 1996: 97).

Most of these characteristics of monumentality apply to the palatial area of major Minoan urban settlements. The monumentality of palaces has been highlighted in close relation with surroundings courts and open areas logically considered as privileged viewpoints (see Letesson and Vansteenhuyse 2006 for a summary and references) or as the climax in ceremonial urban itineraries (Driessen 2009). With the exception of Zakros, palaces towered in the skyline of Minoan towns because they were usually set on higher ground and most likely had more storeys than surrounding buildings. Of course, on a case-by-case basis, some Minoan urban environments or parts of them have been termed monumental (e.g. Cunningham 2001, 2007 for the street system and certains areas of Palaikastro; chapter 9 for a particular type of masonry at Gournia). However, with the notable exception of palatial central areas, the concept of monumentality does not seem to have attracted much attention in studies of Minoan urbanism. This is probably due more to the very nature of Minoan urban contexts than to a lack of interest or a research lacuna. As noted by Branigan (2001b: 44): 'Apart from the palaces, Minoan towns were not dominated by the architecture of power'.

15.4.2. Cities, Power, and Inequality

Evans (1928: 560–3) contrasted the situation of Knossos with that of 'provincial towns' such as Gournia and Palaikastro, and concluded that the power of his Priest-King was so all-encompassing that 'severe legislations' probably existed and influenced the free-standing character of individual houses while shaping very clear urban zones: 'the inner residential quarter' termed 'city' (i.e. the wealthy neighbourhoods), and 'poorer outlying zones' as one progressed away from the centre (see also Whitelaw 2001, 2004). Evans cited Ebenezer Howard's Garden City as a model for his Knossos (Evans 1928: 561). For Hutchinson (1950), town planning was assumed to be a top-down civic process, for which there was no evidence in Minoan Crete. He noted the usual concentration of finer buildings in the centre of settlements and simply argued that 'the big man grabs the best site and various smaller houses grew up around it', a phenomenon that, according to him, carried on from the Early to the Late Bronze Age (Hutchinson 1950: 204–7). He also noted that the 'cellular expansion' (i.e. agglutinative nature) of many buildings was the sign of a 'highly individual and specialised society with not very rigid class distinction' (Hutchinson 1950: 205) and that the way 'the little houses and cottages nestle up against the palaces' was not evocative of 'any form of democracy but of a very friendly relationship between theocratic rulers and their people' (Hutchinson 1950: 207; see Bintliff 1984 for a brilliant critique).

Later Minoan scholars who considered town planning in Proto- and Neopalatial urban centres were divided on its socio-political implications between central authority (top-down) and community self-organization (bottom-up), although these processes have rarely been defined or critically examined. For van Effenterre (1980: 279–81) and Damiani-Indelicato (1982), Protopalatial towns were characterized by relatively egalitarian social groups with a civic community and participatory institutions. According to them, in the Neopalatial period a centralized, autocratic palatial system was finally consolidated. In her detailed investigation of the Akrotiri town-plan, Palyvou (1986, 2005) noted the existence of 'rules of good neighbourliness' and 'signs of a well-organized community with strong traditions and unwritten laws' that she considered typically Minoan. Chryssoulaki (1990: 380) clearly believes in the existence of a central authority but wonders if regulations were enforced by civil servants and government officials or expressed through an enduring sense of collectivity and tradition.

Illustrating how spatial organization was often site-specific while Minoans symbolically demonstrated and drew power from participation in a larger centralized ideology, Cunningham (2007: 109) argued for the existence of corporate strategies and the absence of a strong centralized authority. Although he noticed that it is sometimes difficult to recognize the difference between actual town planning and controlled agglutination, he interpreted the care and ornamentation of Palaikastro's street system as a clear sign of a town-wide operation that did not necessarily correlate with a coercive control of labour (Cunningham 2001: 102–3; 2007: 109). In his broader analysis of street networks, Gomrée (2013: 932–7) also underlined that the conception (contra Platon 1990: 381), construction and maintenance of streets and open spaces certainly implied a managing authority but also the rallying of a wide community through consensus. For him, the Neopalatial period saw a possible organizational shift with top-down processes taking over earlier bottom-up initiatives (Gomrée 2013: 939), an idea implied previously by van Effenterre (1980).

Although recently there have been interesting theoretical debates on the interplay between hierarchy and heterarchy in the socio-political organization of Minoan Crete (Schoep and Knappett 2004; Schoep, Tomkins, and Driessen 2012), many of these interpretations are notable more for their speculative nature than for careful inferences from theoretical models or systematic comparative analyses of various Minoan settlements. Perhaps the application of Blanton and Fargher's (2008) comparative model for governance could provide more solid inferences on the role of rulers and power in shaping cities and society. Blanton and Fargher present a continuum from autocratic to collective rule, and in subsequent papers have begun the task of operationalizing their model with archaeological data (Blanton and Fargher 2012; Fargher, Heredia Expinoza, and Blanton 2011). Similarly, discussions of the relative inequality or homogeneity of Minoan urban populations would benefit from the application of quantitative models such as the Gini index (Smith et al. 2014). Furthermore, as discussed in section 15.3, tracing low-level meanings at different scales of the Minoan built environment could also open up new research perspectives on middle-level meanings.

15.4.3. Images of the City

Although Minoan iconography is not devoid of scenes that seem to evoke urban environments, very few scholars have addressed the importance of these representations in a broader reflection on the urban phenomenon. Most of the time, particular pieces, such as the *Town Mosaic*, are simply and briefly mentioned as potential depictions of Minoan towns (Hutchinson 1950: 210; Palyvou 2005: 25–6). Driessen (2009: 42) also concisely evoked the enduring effect that iconography had in the minds of several generations of scholars, bringing out the originality of Minoan urbanism. To date, Boulotis (1990, 2009) has offered the most elaborate approach to urban iconography. He argued that, at the beginning of the Neopalatial period, 'a narrative thematic cycle with the city as its fixed reference point was articulated and rapidly disseminated in diverse art forms in the Cyclades and Mycenaean Greece, reaching its peak during the Late Bronze Age I period' (Boulotis 2009: 87). For him, this cycle began with the *Town Mosaic* found by Evans (1921: 301–14) at Knossos. These faience plaques depict multi-storeyed houses with what seems to be isodomic ashlar masonry, windows and flat roofs but also elements of the natural environment (flora, fauna, and wavy lines probably evoking the sea) together with a few human figures. Evans (1921: 307–8) also saw towers, gates, and bastions evocative of fortification, a view that Boulotis did not seem to share. Both, however, agreed on the fact that the *Town Mosaic* depicted an urban settlement, probably of considerable size (Boulotis 2009: 87–8; Evans 1921: 308).

Highlighting its vivid evocation of the interplay between built environment, open spaces and natural features, Boulotis (2009: 90–2) considered the *Town*

Mosaic the detailed 'portrait of a city', an unprecedented fact in the broad contemporary Aegean and Near-Eastern contexts (Boulotis 1990). He also suggested that the plaques demonstrate a 'clear awareness of the concept of the city' with, as in actual Minoan towns, the palace and urban tissue almost forming an organic whole but also with the existence of building blocks and open areas (Boulotis 2009: 91–2). Later on, such typical characteristics could be found in the *Flotilla Fresco* from the West House at Akrotiri (Strasser 2010). According to Boulotis (2009: 94), this miniature freeze featured up to five different cities with their own architectural, geographical, and topographical characteristics, with, for example, to the left of the so-called *Departure Town*, small buildings that could evoke 'suburbs' at the verge of the urban settlement. Many interpretations of this fresco exist and actual sites—from Crete or Thera—tentatively identified within it (Boulotis 2009: 96; Strasser 2010: 6–8); however, scholars usually agree on the urban feeling conveyed through the iconography. Boulotis (2009: 94) also noted that such townscapes were absent in wall paintings from Crete. In his opinion, the so-called *Master Impression* was nonetheless the evocation of similar urban features in another medium (Boulotis 2009: 95).

Fletcher (2010: 462–7) has noted that narratives related to the city or to some of its constituents, often idealistic, have to be considered with great caution as they often 'seek to represent the differing engagement with…space by different sectors of the community'. Perhaps the urban scenes in Minoan iconography would be better viewed as works of political propaganda rather than actual depictions of townscapes. A similar argument concerning the recurring appearance of crowd scenes, communal activities, and representations of towns was made by Cunningham (2007: 107) who noted that, in the Neopalatial period, Minoan iconography could well have been mobilized by elites to convey ideas of equality and communality among the wider society to maintain their privileged position. This iconographical diffusion of a symbolic propaganda at the island-scale, usually considered as emanating from Knossos, is also discussed by Blakolmer (2010, 2012) and Bevan (2010).

Nevertheless, where iconography is concerned, contextual information really has to be taken into consideration. For example, the *Sacred Grove and Dance* or *Grand Stand* frescoes evoked by Cunningham (2007) were actually found in a relatively small and secluded room of the palace of Knossos, maybe not the best location for large-scale political propaganda. On a similar line of thought, the *Town Mosaic* might actually have been inlays adorning a chest rather than a wall surface. On such a support, the overall theme might have been quite different: the totality of the townscape receding in favour of a complex microcosmic scene, not so different from shrine models. In other words, a cautious analysis of the potential low-level meanings of the architectural or material settings of Minoan iconography is instrumental in exploring higher level of meanings (Letesson 2014, forthcoming).

15.5. HIGH-LEVEL MEANINGS IN THE MINOAN BUILT ENVIRONMENT

Together with more general discussions on orientation which were often assigned a ritual significance (Preziosi 1983: 501–9; Shaw 1973), some scholars have related Minoan buildings to celestial features (Goodison 2001, 2004; MacGillivray 2004). Soles (1995) also entertained the idea of the cosmological importance of Knossos, even if he did not really expand on its material correlates in urban forms. Driessen (2004) argued that the palaces—and particularly their central courts—could have been modelled in the image of the Cretan landscape as a whole. He noted that the central court may have functioned as a 'cosmic reminder of the island itself' evoking the open plain surrounded by mountains (Driessen 2004: 77). The original idea of facades forming 'man-made "peaks" in the eye of the observer' came from Day and Wilson (2002: 157–8), and the idea was further explored by Letesson and Vansteenhuyse (2006: 108–12) using Higuchi's (1983) concept of borrowed landscape. Hitchcock (2007) also underlined various symbolic or associative references to the landscape in Minoan architecture and urban environments and suggested that palaces might have been arenas of institutionalized versions of early rural and popular religious ceremonies.

It might seem that high-level meanings are difficult or impossible to reconstruct in the absence of texts, and as such these interpretations must essentially be regarded as speculative. Even in the turn towards things in anthropology, the avowed emphasis on the meaningfulness of things was often only really negotiated via ethnographic informants—i.e. participants telling ethnographers what things mean (see Henare et al. 2007; Holbraad 2011). However, Holbraad (2011) has argued that this is not a necessary condition for 'emancipating things', and that an 'empirical ontology' should be possible whereby one relies on observations of the materiality itself, and its conceptual affordances, in order to access meaning. Much closer to our current focus, Andrew Shapland has taken some of these insights from the ontological turn and sought to determine how we might characterize Aegean Bronze Age ontologies. Using in particular the work of Descola, and his distinctions between naturalism, analogism, totemism, and animism, Shapland (2013) suggests that one can work solely from materialities to reveal the analogist logic informing Minoan art. Finding encouragement in these approaches, and putting them together with our idea of 'nested semiogenesis', perhaps high-level meanings in the built environment are not entirely unattainable—especially when we are careful to trace their articulations with low- and middle-level meanings. The recursive interactions between people and built space might actually be a very promising way to unveil different aspects of Minoan world-views and ontologies.

15.6. DISCUSSION

With this brief review, we hope to have conveyed a sense of what are currently considered important features of Minoan urbanism and urbanization. Our argument is that we need accurate and systematic definitions of the various features of Bronze Age Cretan towns if we are to develop successful analytical and comparative approaches. If studies rely only on a selection of formal characteristics, a whole range of elements that constitute Minoan urban fabrics risk being disregarded or treated atomistically. In parallel, in urban as well as architectural studies, it cannot be assumed that the meaning of patterns detected is obvious and easily translated into relevant interpretation. It is precisely in this regard that comparative analyses can shed light on a whole range of issues pertaining to Minoan urbanism while allowing us to measure the extent to which research questions can be investigated with the data we have at our disposal.

By mobilizing Rapoport's model we argue that meanings of the built environment can be traced as interrelated phenomena. If one admits that different levels of meanings were communicated by buildings, towns, and settlement patterns at different spatial and temporal scales, further questions of course arise: how do meanings emanating from the bottom up (e.g. recursive daily interactions with architecture materializing particular spatial arrangements) articulate with meanings dictated from the top down (e.g. hypothetical palatial/central authority rules concerning particular zonation in towns)? Do meanings necessarily become higher-order when they are standardized across space and time (e.g. as with the concomitant urbanization of the major palatial centres, or Knossian supremacy during the Neopalatial period)? These are clearly important questions. We have argued here that one way to address them is by following the logic of nested semiogenesis. In other words, meanings can operate at different levels simultaneously: for example, for people navigating Neopalatial buildings on a daily basis, circulation patterns were certainly ingrained through recursive interactions (Letesson 2015) but, at the same time, it is middle-level meanings that are conveyed by the articulated organization of architecture. Architectural differentiation (i.e. the tendency to reduce the number of multifunctional spaces) and spatial segmentation (i.e. the tendency to separate spaces according to their function) indeed served to display people's status and identity on the basis of to their activities but also, probably, according to their class, age, and gender (see also chapter 5). We could even be tempted to hypothesize that this might, in some way, have been related to a growing Knossian (or palatial) conceptual/symbolic hegemony through what one of us has labelled 'strategies of objectification' (Knappett 2011: 121–2). The real challenge, though, is to trace these connections between levels of meaning and, in our opinion, this first requires a very careful examination of the potential low-level meanings of what remains of the Minoan built environment (Letesson 2015).

As exemplified by Buell and McEnroe's work in Gournia (see chapter 9), detailed intra-site studies can provide precious information, even in those settlements that have been originally excavated at the beginning of the twentieth century. Such a detailed level of description applied to a large number of urban and architectural features is certainly a first step—if not a prerequisite—towards a fuller understanding of the dynamics and semiogenesis of Minoan buildings and townscapes. And yet, to go beyond the micro- or meso-scale specificities of individual settlements or buildings, data should be be generated in ways that will enable comparisons between sites (see section 15.3.5; see also chapter 7). In other words, in this concluding chapter, we have also underlined the need for standardized descriptions. This does not mean that Minoan archaeologists have to describe their urban remains in exactly the same way but rather that it is crucial to agree on what needs to be described and why. As a matter of fact, it is only through the compilation of datasets gathering comparable information on similar urban features that a proper analytical approach to the Minoan built environment is possible.

It is also worth noting that such analyses of Minoan urbanism could also enrich broader urban studies by expanding their list of comparative material. As stated in a recent collaborative tribune in *American Antiquity* (Kintigh et al. 2014: 9–10), understanding the growth of small-scale human communities into spatially and demographically larger and politically more complex entities, and fostering systematic investigations of prehistoric and historic urban landscapes that could shed light on the social and demographic processes driving urbanization and its consequences, are among the 'grand challenges for archaeology'. There is indeed a growing field of research highlighting how the study of ancient cities could help shed light on modern urban issues and challenges (e.g. Fletcher 2010; Smith 2010b; Smith 2012; York et al. 2010). So far, Bronze Age Cretan examples have barely been mobilized in such studies but could certainly be quite informative and make a worthwhile contribution to studies of various urban phenomena and processes, a crucial undertaking in our 'age of cities' (Batty 2013).

For nearly two decades, Minoan archaeology has been increasingly concerned with a broad critical reassessment of its founding years and the general narratives and models they inspired (e.g. Driessen et al. 2002; Hamilakis 2002; Schoep, Tomkins, and Driessen 2012), thereby acknowledging its current limitations while also welcoming innovative and challenging research perspectives (e.g. Cappel, Günkel-Maschek, and Panagiotopoulos 2015). A major goal of this book is to adopt this critical perspective with regard to studies of Minoan urbanism and architecture. With all the contributors to this volume, we hope to have demonstrated that an acute re-examination of and a continued interest in construction techniques, typo-morphology, spatial configuration, site distribution, etc. can show how Bronze Age Cretan urban agglomerations, other types of settlements, and, more generally, built environments operated and how, ultimately, they had an active role in shaping Minoan society.

NOTES

1. The process of making meaning is typically described as 'semiosis', and so any approach to meaning cannot avoid 'semiotics'. However, Rapoport is somewhat sceptical of semiotics, as he associates it with linguistic models of meaning, which he quite fairly critiques on various points, not least for being insufficiently pragmatic in orientation. His response is to turn towards symbolic interactionism, especially the work of Herbert Blumer, with its assertions that people act towards things according to the meanings they ascribe to them, with these meanings in themselves generated through social interactions with others. This formulation offers the pragmatic basis for meaning that Rapoport seeks; and yet it is hardly a move away from semiotics, because it is very much in line with the semiotic of C. S. Peirce, which is richly pragmatic in its scope. Rapoport, however, does not cite Peirce (at least, not in his 1990 book *The Meaning of the Built Environment*); and yet Peirce certainly seems to have had some influence on the development of symbolic interactionism, despite some important differences between the different strands of American pragmatism (Lewis 1976; Herman and Reynolds 1994). Thus in utilizing Rapoport's model we should be aware of this broader context in terms of approaches to meaning; not least as Peirce's doctrine of categories, consisting of Firstness, Secondness, and Thirdness (Preucel 2006: 52), may be largely compatible with Rapoport's three levels of meaning, and more wide-ranging in its applications and implications.
2. Fletcher's model establishes a strong correlation between residential density, the overall extent of settlements, and the ultimate growth or decline of towns and cities. According to him, for an urban community to cross certain size and density thresholds particular material assemblages have to be available to mitigate the high level of social stress resulting from increasing interactions (Fletcher 1995: xxiii, 126–62). According to Fletcher (1995: 21–8), material features such as durable materials, baffles and barriers, stored data, and calendrics, as well as various formal properties of urban architecture, can regulate signals and carry messages, therefore maintaining/reinforcing the legibility of the built environment, a prerequisite for the resilience of urban communities especially when settlements become increasingly large and densely populated.

REFERENCES

Arnold, J. E. and A. Ford. 1980. 'A Statistical Examination of Settlement Patterns at Tikal, Guatemala'. *American Antiquity* 45: 713–26.

Bairoch, P. 1989. 'Urbanisation and the Economy in Preindustrial Societies: The Findings of Two Decades of Research'. *Journal of European Economic History* 18: 239–90.

Batty, M. 2013. *The New Science of Cities*. Cambridge, MA: MIT Press.

Behar, C. 2003. *A Neighborhood in Ottoman Istanbul: Fruit Vendors and Civil Servants in the Kasap Ilyas Mahalle*. Albany, NY: State University of New York Press.

Bevan, A. 2010. 'Political Geography and Palatial Crete'. *Journal of Mediterranean Archaeology* 23.1: 27–54.

Bevan, A. and A. Wilson. 2013. 'Models of Settlement Hierarchy Based on Partial Evidence'. *Journal of Archaeological Science* 40: 2415–27.

Bintliff, J. L. 1984. 'Structuralism and Myth in Minoan Studies'. *Antiquity* 58: 33–8.

Blakolmer, F. 2010. 'La peinture murale dans le monde minoen et mycénien: distribution, fonctions des espaces, déclinaisons du répertoire iconographique'. In *Espace civil et espece religieux en Grèce à l'époque mycénienne*, edited by I. Boehm and S. Müller. Lyon: Maison de l'Orient et de la Méditerranée—Jean Pouilloux: 147–70.

Blakolmer, F. 2012. 'Image and Architecture: Reflections of Mural Iconography in Seal Images and Other Art Forms of Minoan Crete'. In *Minoan Realities. Approaches to Images, Architecture, and Society in the Aegean Bronze Age* (Aegis 5), edited by D. Panagiotopoulos and U. Günkel-Maschek. Louvain-la-Neuve: Presses universitaires de Louvain: 83–114.

Blanton, R. E. 1995. 'A Functionalist Paradigm for Architectural Analysis: Review of Architecture and Order, edited by M. Parker Pearson and C. Richards'. *Cambridge Archaeological Journal* 5: 303–5.

Blanton, R. E. and L. F. Fargher. 2008. *Collective Action in the Formation of Pre-Modern States*. New York: Springer.

Blanton, R. E. and L. F. Fargher. 2012. 'Neighborhoods and the Civic Constitutions of Pre-Modern Cities as Seen from the Perspective of Collective Action'. In *The Neighborhood as a Social and Spatial Unit in Mesoamerican Cities*, edited by M. C. Arnauld, L. R. Manzanilla, and M. E. Smith. Tucson, AZ: University of Arizona Press: 27–52.

Boulotis, C. 1990. 'Villes et palais dans l'art égéen du IIe millénaire av. J.-C'. In *L'habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Paris: École française d'Athènes: 421–59.

Boulotis, C. 2009. 'Representations of Cities in Aegean Art of the Second Millennium BC: Mute narratives of Prehistory'. In *A History of the Greek City*, edited by A. Lagopoulos. Oxford: Archaeopress: 87–98.

Branigan, K. 1972. 'Minoan Settlements in East Crete'. In *Man, Settlement and Urbanism*, edited by R. Tringham, P. Ucko, and G. W. Dimbledy. London: Duckworth: 751–9.

Branigan, K. 2001a. *Urbanism in the Aegean Bronze Age*. London: Sheffield Academic Press.

Branigan, K. 2001b. 'Aspects of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 38–50.

Buell, D. M. 2014. 'Districts, Neighbourhoods, and the Streets that Bind Them: Urban Planning in Minoan Cities'. In *Meditations on the Diversity of the Built Environment in the Aegean Basin and Beyond: Proceedings of a Colloquium in Memory of Frederick E. Winters, Athens, 22–23 June 2012*, edited by D. W. Rupp and J. E. Tomlinson. Athens: Canadian Institute in Greece: 55–82.

Buell, M. 2015. 'Minoan Cityscapes: Urban Planning in Neopalatial Society'. In *Minoan Archaeology: Perspectives for the 21st Century* (Aegis 8), edited by

S. Cappel, U. Günkel-Maschek, and D. Panagiotopoulos. Louvain-la-Neuve: Presses universitaires de Louvain: 77–91.

Cappel, S., U. Günkel-Mascheck, and D. Panagiotopoulos (eds). 2015. *Minoan Archaeology: Perspectives for the 21st Century* (Aegis 8). Louvain-la-Neuve: Presses universitaires de Louvain.

Çelik, Z., D. G. Favro, and R. Ingersoll (eds). 1994. *Streets: Critical Perspectives on Public Space*. Berkeley, CA: University of California Press.

Cerasi, M. 1998. 'The Formation of Ottoman House Types: A Comparative Study in Interaction with Neighboring Cultures'. *Muqarnas* 15: 116–56.

Chryssoulaki, S. 1990. 'L'urbanisme minoen. A. Le réseau routier urbain'. In *L'habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Paris: École française d'Athènes: 371–80.

Cowgill, G. L., J. H. Altschul, and R. S. Sload. 1984. 'Spatial Analysis of Teotihuacan, a Mesoamerican Metropolis'. In *Intrasite Spatial Analysis in Archaeology*, edited by H. J. Hietala. Cambridge: Cambridge University Press: 154–95.

Cunningham, T. 2001. 'Variations on a Theme: Divergence in Settlement Patterns and Spatial Organization in the Far East of Crete during the Proto- and Neopalatial Periods'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 72–86.

Cunningham, T. 2007. 'In the Shadows of Kastri: An Examination of Domestic and Civic Space at Palaikastro (Crete)'. In *Building Communities: House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fischer, and J. Whitley. London: British School at Athens: 99–109.

Damiani-Indelicato, S. 1982. *Piazza pubblica e palazzo nella Creta Minoica*. Rome: Jouvence.

Damiani-Indelicato, S. 1984. 'Gournia, cité minoenne'. In *Aux origines de l'hellénisme: la Crète et la Grèce. Hommage à Henry van Effenterre*, edited by Centre Gustave Glotz. Paris: Publications de la Sorbonne: 47–54.

Day, P. M. and D. E. Wilson. 2002. 'Landscapes of Memory, Craft and Power in Prepalatial and Protopalatial Knossos'. In *Labyrinth Revisited: Rethinking 'Minoan' Archaeology*, edited by Y. Hamilakis. Oxford: Oxbow Books: 143–66.

Déderix, S. 2017. 'Communication Networks, Interactions, and Social Negotiation in Prepalatial South-Central Crete'. *American Journal of Archaeology* 121.1: 5–37.

Driessen, J. 2001. 'History and Hierarchy: Preliminary Observations on the Settlement Pattern in Minoan Crete'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 51–71.

Driessen, J. 2004. 'The Central Court of the Palace at Knossos'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 75–82.

Driessen, J. 2009. 'Daidalos' Designs and Ariadne's Threads: Minoan Towns as Places of Interaction'. In *Inside the City in the Greek World: Studies of Urbanism from the Bronze Age to the Hellenistic Period*, edited by S. Owen and L. Preston. Oxford: Oxbow Books: 41–54.

Driessen, J., I. Schoep, and R. Laffineur (eds). 2002. *Monuments of Minos: Rethinking the Minoan Palaces. Proceedings of an International Workshop held in Louvain-la-Neuve, 2001* (Aegaeum 23). Liège: Université de Liège.

Driessen, J., I. Schoep, F. Carpentier, I. Crevecoeur, M. Devolder, F. Gaignerot-Driessen, P. Hacigüzeller, V. Isaakidou, S. Jusseret, C. Langohr, Q. Letesson, and A. Schmitt. 2011. *Excavations at Sissi, II. Preliminary Report on the 2009–2010 Campaigns* (Aegis 4). Louvain-la-Neuve: Presses universitaires de Louvain.

Evans, A. 1921. *The Palace of Minos at Knossos I*. London: Macmillan.

Evans, A. 1928. *The Palace of Minos at Knossos II*. London: Macmillan.

Fargher, L. F., V. Y. Heredia Expinoza, and R. E. Blanton. 2011. 'Alternative Pathways to Power in Late Postclassic Highland Mesoamerica'. *Journal of Anthropological Archaeology* 30: 306–26.

Faust, A. 2003. 'Residential Patterns in the Ancient Israelite City'. *Levant* 35: 123–38.

Fletcher, R. 1995. *The Limits of Settlement Growth: A Theoretical Outline*. Cambridge: Cambridge University Press.

Fletcher, R. 2010. 'Urban Materialities: Meaning, Magnitude, Friction, and Outcomes'. In *The Oxford Handbook of Material Culture Studies*, edited by D. Hicks and M. C. Beaudry. Oxford: Oxford University Press: 459–83.

Gibson, J. 1979. *The Ecological Approach to Visual Perception*. Boston, MA: Houghton Mifflin.

Gomrée, T. 2013. 'La Voirie des villes minoennes en Crète orientale et à Cnossos (Minoen Moyen I–Minoen Récent I)'. PhD dissertation. Université Lumiére Lyon 2.

Goodison, L. 2001. 'From Tholos to Throne Room: Perceptions of the Sun in Minoan Ritual'. In *Potnia. Deities and Religian in the Aegean Bronze Age* (Aegaeum 22), edited by R. Laffineur and R. Hägg. Liège: Université de Liège: 77–89.

Goodison, L. 2004. 'From Tholos Tomb to Throne Room: Some Considerations of Dawn Light and Directionality in Minoan Buildings'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 339–50.

Griffiths, S. 2012. 'The Use of Space Syntax in Historical Research: Current Practice and Future Possibilities'. Paper presented at the 8th International Space Syntax Symposium, Santiago. <http://docplayer.net/32237224-The-use-of-space-syntax-in-historical-research-current-practice-and-future-possibilities.html>.

Hakim, B. S. 1986. *Arab-Islamic Cities: Building and Planning Principles*. London: Routledge.

Hamilakis, Y. (ed.). 2002. *Labyrinth Revisited: Rethinking 'Minoan' Archaeology*. Oxford: Oxbow Books.

Henare, A., M. Holbraad, and S. Wastell (eds). 2007. *Thinking Through Things: Theorising Artefacts Ethnographically*. London: Routledge.

Herbert, D. T. and C. J. Thomas. 1997. *Cities in Space: City as Place*. 3rd edn. London: David Fulton.

Herman, N. J. and L. T. Reynolds. 1994. *Symbolic Interaction: An Introduction to Social Psychology*. Dix Hills, NY: General Hall.

Higuchi, T. 1983. *The Visual and Spatial Structure of Landscapes*. Cambridge: Cambridge University Press.

Hillier, B. 1996. *Space is the Machine: A Configurational Theory of Architecture*. Cambridge: Cambridge University Press.

Hillier, B., A. Penn, J. Hanson, T. Grajewski, and J. Xu. 1993. 'Natural Movement: Or, Configuration and Attraction in Urban Pedestrian Movement'. *Environment and Planning B: Planning and Design* 20.1: 29–66.

Hitchcock, L. 2007. 'Naturalising the Cultural: Architectonised Landscape as Ideology in Minoan Crete'. In *Building Communities. House, Settlement and Society in the Aegean and Beyond*, edited by R. Westgate, N. Fischer, and J. Whitley. London: British School at Athens: 91–7.

Holbraad, M. 2011. 'Can the Thing Speak?'. OAP Press, Working Paper Series 7.

Hood, S., P. Warren, and G. Cadogan. 1964. 'Travels in Crete, 1962'. *Annual of the British School at Athens* 59: 50–99.

Hutchinson, R. W. 1950. 'Prehistoric Town Planning in Crete'. *Town Planning Review* 21.3: 199–220.

Kintigh, K. W., J. H. Altschul, M. C. Beaudry, R. D. Drennan, A. P. Kinzig, T. A. Kohler, W. F. Limp, H. D. G. Maschner, W. K. Michener, T. R. Pauketat, P. Peregrine, J. A. Sabloff, T. J. Wilkinson, H. T. Wright, and M. A. Zeder. 2014. 'Grand Challenges for Archaeology'. *American Antiquity* 79.1: 5–24.

Knappett, C. 2011. *An Archaeology of Interaction: Network Perspectives on Material Culture and Society.* Oxford: Oxford University Press.

Letesson, Q. 2014. 'From Building to Architecture: The Rise of Configurational Thinking in Bronze Age Crete'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 49–90.

Letesson, Q. 2015. 'Fire and the Holes: An Investigation of Low-Level Meanings in the Minoan Built Environment'. *Journal of Archaeological Method and Theory* 22.3: 713–50.

Letesson, Q. Forthcoming. 'Contexts of Aegean Art: Palaces'. In *A Companion to Aegean Art and Architecture*, edited by L. Hitchcock and B. Davis. New York: Wiley.

Letesson, Q. and J. Driessen. 2008. 'From "Party" to "Ritual" to "Ruin" in Minoan Crete: The Spatial Context of Feasting'. In *Dais: The Aegean Feast* (Aegaeum 29), edited by L. Hitchcock, R. Laffineur, and J. Crowley. Liège: Université de Liège: 207–15.

Letesson, Q. and K. Vansteenhuyse. 2006. 'Towards an Archaeology of the Perception: "Looking" at the Minoan Palaces'. *Journal of Mediterranean Archaeology* 19.1: 91–119.

Lewis, J. D. 1976. 'The Classic American Pragmatists as Forerunners to Symbolic Interactionism'. *Sociological Quarterly* 17: 347–59.

MacGillivray, J. A. 2004. 'The Astral Labyrinth at Knossos'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 329–38.

MacGillivray, J. A., J. Driessen, and L. H. Sackett. 2000. *The Palaikastro Kouros: A Minoan Chryselephantine Statuette and its Aegean Bronze Age Context*. London: British School at Athens.

MacGillivray, J. A., L. H. Sackett, D. A. Smyth, J. Driessen, D. J. Lyness, B. A. Hobbs, and A. A. D. Peatfield. 1984. 'An Archaeological Survey of the Rousolakkos Area at Palaikastro'. *Annual of the British School at Athens* 79: 129–59.

Manning, S. 1999. 'Knossos and the Limit of Settlement Growth'. In *Meletemata. Studies in Aegean Archaeology Presented to Malcom H. Wiener as He Enters his 65th Year* (Aegaeum 20), edited by P. P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier. Liège: Université de Liège: 469–80.

McEnroe, J. C. 1979. 'Minoan House and Town Arrangement'. PhD thesis. University of Toronto.

McEnroe, J. C. 2010. *Architecture of Minoan Crete: Constructing Identity in the Aegean Bronze Age*. Austin, TX: University of Texas Press.

Moore, J. D. 1996. *Architecture and Power in the Ancient Andes: The Archaeology of Public Buildings*. Cambridge: Cambridge University Press.

Müller, S. 1991. 'Routes minoennes en relation avec le site de Malia'. *Bulletin de Correspondance Hellénique* 115: 545–60.

Myers, J. W., E. Emlen Myers, and G. Cadogan (eds). 1992. *The Aerial Atlas of Ancient Crete*. London: Thames and Hudson.

Palyvou, C. 1986. 'Notes on the Town Plan of Late Cycladic Akrotiri, Thera'. *Annual of the British School at Athens* 81: 179–94.

Palyvou, C. 2004. 'Outdoor Space in Minoan Architecture: Community and Privacy'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 207–17.

Palyvou, C. 2005. *Akrotiri, Thera: An Architecture of Affluence 3,500 Years Old*. Philadelphia, PA: INSTAP Academic Press.

Palyvou, C. 2009. 'The Cities of Crete during the Minoan Age'. In *A History of the Greek City*, edited by A. Lagopoulos. Oxford: Archeopress: 71–86.

Pearson, M. P. and C. Richards (eds). 1994. *Architecture and Order*. London: Routledge.

Platon, L. 1990. 'L'urbanisme minoen. B. Espace intérieur et espace extérieur dans la ville minoenne'. In *L'habitat égéen préhistorique*, edited by P. Darcque and R. Treuil. Paris: École française d'Athènes: 381–93.

Poursat, J.-C. 1988. 'La ville minoenne de Malia: recherches et publications récentes'. *Revue Archéologique* 1: 61–82.

Poursat, J.-C. 1996. *Fouilles exécutées à Malia. Le Quartier Mu III. Artisans Minoens: Les Maisons-Ateliers du Quartier Mu*. Paris: École française d'Athènes.

Preucel, R. 2006. *Archaeological Semiotics*. Oxford: Blackwell.

Preziosi, D. 1983. *Minoan Architectural Design: Formation and Signification*. Berlin: Mouton.

Rackham, O. and J. Moody. 1996. *The Making of the Cretan Landscape*. Manchester: Manchester University Press.

Rapoport, A. 1969. *House Form and Culture*. Englewood Cliffs, NJ: Prentice-Hall.

Rapoport, A. 1988. 'Levels of Meaning in the Built Environment'. In *Cross-Cultural Perspectives in Non Verbal Communication*, edited by F. Poyatos. Toronto: C. J. Hogrefe: 317–36.

Rapoport, A. 1990. *The Meaning of the Built Environment: A Nonverbal Communication Approach*. 2nd edn. Tucson, AZ: University of Arizona Press.

Renfrew, C. 1972. *The Emergence of Civilisation. The Cyclades and the Aegean in the Third Millenium B.C.* London: Methuen.

Schoep, I. and C. Knappett. 2004. 'Dual Emergence: Evolving Heterarchy, Exploding Hierarchy'. In *The Emergence of Civilization Revisited*, edited by J. C. Barrett and P. Halstead. Oxford: Oxbow Books: 21–37.

Schoep, I., P. Tomkins, P. Driessen, and J. Driessen (eds). 2012. *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*. Oxford: Oxbow Books.

Shapland, A. 2013. 'Shifting Horizons and Emerging Ontologies in the Bronze Age Aegean'. In *Relational Archaelogies: Humans, Animals, Things*, edited by C. Watts. London: Routledge: 190–208.

Shaw, J. W. 1973. 'The Orientation of the Minoan Palaces'. In *Antichità cretesi: studi in onore di Doro Levi I*, edited by G. Carratelli and G. Rizza. Catania: Università di Catania, Instituto di archeologia: 47–59.

Sjoberg, G. 1960. *The Preindustrial City: Past and Present*. New York: Free Press.

Smith, M. E. 2003. 'Can We Read Cosmology in Ancient Maya City Plans? Comment on Ashmore and Sabloff'. *Latin American Antiquity* 14: 221–8.

Smith, M. E. 2007. 'Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning'. *Journal of Planning History* 6.1: 3–47.

Smith, M. E. 2008. *Aztec City-State Capitals*. Gainesville, FL: University Press of Florida.

Smith, M. E. 2010a. 'The Archaeological Study of Neighborhoods and Districts in Ancient Cities'. *Journal of Anthropological Archaeology* 29.2: 137–54.

Smith, M. E. 2010b. 'Sprawl, Squatters and Sustainable Cities: Can Archaeological Data Shed Light on Modern Urban Issues?'. *Cambridge Archaeological Journal* 20.2: 229–53.

Smith, M. E. 2012. 'The Role of Ancient Cities in Research on Contemporary Urbanization'. *UGEC Viewpoints* 8: 15–19.

Smith, M. E., T. Dennehy, A. Kamp-Whittaker, E. Colon, and R. Harkness. 2014. 'Quantitative Measures of Wealth Inequality in Ancient Central Mexican Communities'. *Advances in Archaeological Practice* 2.4: 311–23.

Soles, J. 1995. 'The Functions of a Cosmological Centre: Knossos in Palatial Crete'. In *Politeia. Society and State in the Aegean Bronze Age* (Aegaeum 12), edited by R. Laffineur and W.-D. Niemeier. Liège: Université de Liège: 405–14.

Soles, J. 2003. *Mochlos IA. Period III. Neopalatial Settlement on the Coast: The Artisans' Quarter and the Farmhouse at Chalinomouri. The Sites*. Philadelphia, PA: INSTAP Academic Press.

Strasser, T. 2010. 'Location and Perspective in the Theran Flotilla Fresco'. *Journal of Mediterranean Archaeology* 23.1: 3–26.

Trigger, B. G. 1990. 'Monumental Architecture: A Thermodynamic Explanation of Symbolic Behaviour'. *World Archaeology* 22: 119–32.

Tsipopoulou, M. 1997. 'Palace-Centered Polities in Eastern Crete'. In *Urbanism in Antiquity. From Mesopotamia to Crete*, edited by W. E. Aufrecht, N. A. Mirau, and S. W. Gauley. Sheffield: Sheffield Academic Press: 263–77.

Turner, A. and A. Penn. 2002. 'Encoding Natural Movement as an Agent-based System: An Investigation into Human Pedestrian Behaviour in the Built Environment'. *Environment and Planning B: Planning and Design* 29: 473–90.

Tzedakis, Y., S. Chryssoulaki, Y. Venieri, and M. Argouli. 1990. 'Les Routes minoennes: le poste de Choiromandres et le contrôle des communications'. *Bulletin de Correspondance Hellénique* 114: 43–62.

Tzedakis, Y., S. Chryssoulaki, S. Voutsaki, and Y. Venieri. 1989. 'Les Routes minoennes: rapport préliminaire, défense de la circulation ou circulation de la défense?'. *Bulletin de Correspondance Hellénique* 113: 43–75.

van Effenterre, H. 1963. 'Voies et places publiques au Nord-Est du Palais de Mallia'. *Bulletin de Correspondance Hellénique* 87: 229–51.

van Effenterre, H. 1980. *Le palais de Mallia et la cité minoenne. Étude de synthèse.* Rome: Edizioni Dell' Ateneo.

van Nes, A. 2014. 'Indicating Street Vitality in Excavated Towns. Spatial Configurative Analyses Applied to Pompeii'. In *Spatial Analysis and Social Spaces: Interdisciplinary Approaches to the Interpretation of Prehistoric and Historic Built Environments*, edited by E. Paliou, U. Lieberwirth, and S. Polla. Berlin: de Gruyter: 277–96.

Warren, P. 1994. 'The Minoan Roads of Knossos'. In *Knossos. A Labyrinth of History. Papers Presented in Honour of Sinclair Hood*, edited by D. Evely, H. Hughes-Brock, and N. Momigliano. London: British School at Athens: 189–210.

Watrous, L. V. 2012. 'The Harbor Complex of the Minoan Town at Gournia'. *American Journal of Archaeology* 116.3: 521–41.

Whitelaw, T. 2001. 'From Sites to Communities: Defining the Human Dimensions of Minoan Urbanism'. In *Urbanism in the Aegean Bronze Age*, edited by K. Branigan. London: Sheffield Academic Press: 15–37.

Whitelaw, T. 2004. 'Estimating the Population of Neopalatial Knossos'. In *Knossos: Palace, City, State*, edited by G. Cadogan, E. Hatzaki, and A. Vasilakis. London: British School at Athens: 147–58.

Whitelaw, T. 2012. 'The Urbanisation of Prehistoric Crete: Settlement Perspectives on Minoan State Formation'. In *Back to the Beginning: Reassessing Social and Political Complexity on Crete during the Early and Middle Bronze Age*, edited by I. Schoep, J. Driessen, and P. Tomkins. Oxford: Oxbow Books: 114–76.

Wrigley, E. A. 1990. 'Brake or Accelerator? Urban Growth and Population Growth Before the Industrial Revolution'. In *Urbanization in History: A Process of Dynamic Interactions*, edited by A. van de Woude, A. Hayami, and J. de Vries. Oxford: Clarendon Press: 101–12.

Xie, J. 2012. 'Human Dimensions of the Street: The Origin and Formation of the Traditional Chinese Street in the Tang-Song Period'. *Journal of Urban Design* 17.3: 389–412.

York, A. M., M. E. Smith, B. W. Stanley, B. L. Stark, J. Novic, S. L. Harlan, G. L. Cowgill, and C. G. Boone. 2010. 'Ethnic and Class Clustering through the Ages: A Transdisciplinary Approach to Urban Neighborhood Social Patterns'. *Urban Studies* 48.11: 2399–415.

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